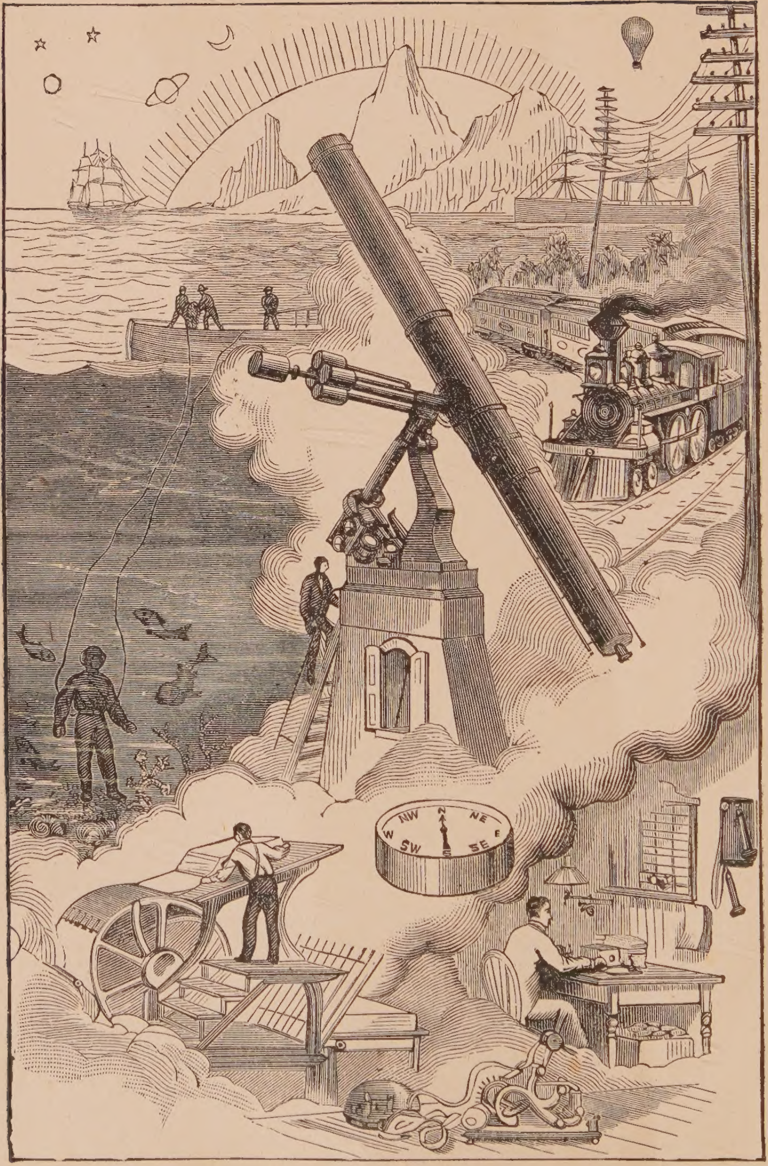
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THE

PROGRESSIVE AGES,

OR THE

TRIUMPHS OF SCIENCE,

AND TREASURES OF

NATURE, HISTORY AND LITERATURE.

COMPILED BY

PROF. H. L. HARVEY.

ILLUSTRATED.

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INTRODUCTION.

IT seems very natural for us, in this age of the world, to overestimate the value of man's acquirements, knowledge and progress in the arts and sciences and in the hidden secrets of nature. This age is so vastly superior to former ages in advantages, that many seem to think that man has reached his highest perfection of knowledge. But this cannot be true, for something must yet remain to learn, no matter what the extent of his knowledge.

We do live, truly, in an enlightened age. For six thousand years man has existed on the earth, and has continued to progress, so that we have before us the inventions and discoveries of preceding ages; and on this foundation our knowledge is built.

But have the great discoveries all been made? And is there no room for further progress? If we believe those who are capable of knowing, we shall find that in their opinion we are just entering the great age of discoveries, and that man's knowledge, compared with what remains to be known, is infinitely small.

Some may ask where is the field for progress? They are directed to the sciences. Astronomy is a science nearly two thousand years old, but is it complete? Do we know all that is to be known about it? Far from it. Natural philosophy and geology, too, are old, yet regarding them, hundreds of unanswerable questions might be asked. Chemistry is in its infancy, and so on through the whole catalogue we see there is plenty of room for genius to develop itself.

Through every day of our lives we experience the light and heat; no one can tell us what they are. Though man has made electricity his servant, and one of the most important agents in civilization, he knows nothing of its nature.

In art, too, there is room for work. Inventions are called for every day which are as yet unknown; but the future will surely bring them out.

Genius must not slumber. There is plenty of work and plenty of room. What the past has left undone the future must accomplish.

CONTENTS.

THE TRIUMPHS OF SCIENCE - - - - 11
SCENES IN THE POLAR REGIONS - - - - 24
INDIA-RUBBER - - - - - - - 40
WHAT PATENTS HAVE DONE - - - - 46
GALILEO - - - - - - - - - 50
NAPOLEON'S PASSAGE OF THE ALPS - - - 57
ALCHEMY AND CHEMISTRY - - - - 66
NATURE'S TEACHINGS - - - - - - - - 73
MORE THAN ONE UNIVERSE - - - - - 83
BOTTOM OF THE OCEAN - - - - - - - 89
PEARL-FISHING IN MEXICO - - - - - 94
NEST-MAKING FISHES - - - - - - - - 97
FISHING IN SARGOSSA SEA - - - - - - 99
SUBTERRANEAN CAVES - - - - - - - - 103
THE GREAT PLAINS - - - - - - - - 110
THE MOUND BUILDERS - - - - - - - 114
THE OLD AMERICA - - - - - - - - 118
FALLS OF THE YELLOWSTONE - - - - - - 121
ANTEDILUVIAN RELICS - - - - - - - 123
CRATER OF KILAUEA - - - - - - - - 129
THE CONQUEST OF MEXICO - - - - - - 133
PATAGONIA AND PATAGONIANS - - - - - - 144
AN OPIUM DEN - - - - - - - - 146
IGNIS FATUUS - - - - - - - - - 148
THE MONKEY RACE - - - - - - - 150
COMBATIVENESS OF BIRDS - - - - - - - 162
GEYSERS OF WYOMING - - - - - - - 164

DESCRIPTION OF AN EARTHQUAKE - - - - - 170
SPORTING IN THE TROPICS - - - - - - 171
COFFEE CULTURE IN BRAZIL - - - - - - 175
THE PRESUMPTUOUS MURDERER - - - - - 178
A FLOATING CITY - - - - - - - - 189
JUGGLERS OF INDIA - - - - - - - - 195
TRAINED ELEPHANTS - - - - - - - - 197
THE ANTARCTIC REGION - - - - - - 203
BAFFIN'S BAY BY MOONLIGHT - - - - - - 206
RUINS OF POMPEII - - - - - - - - 208
UNDER THE ICE - - - - - - - - - 215
THE GREAT MOUNTAINS - - - - - - - 225
LET US HAVE MEN - - - - - - - - 232
PENALTY OF GREATNESS - - - - - - - 235
FERNANDO DE SOTO - - - - - - - - 237
MICHAEL ANGELO - - - - - - - - 241
PAUL GUSTAVE DORE - - - - - - - - 252
THE ROTHSCHILDS - - - - - - - - 254
JOHN JACOB ASTOR - - - - - - - - 258
GREELEY'S SPECIMENS - - - - - - - 263
THE SILENT MONKS - - - - - - - - 266
CLEOPATRA - - - - - - - - - 268
THE NIGHTINGALE - - - - - - - - 272
FAIRY-BELLS - - - - - - - - - 277
DEATH REVEALS NO MYSTERIES - - - - - - 284
HAND WORK - - - - - - - - - 287
SHORT-TAILED MANIS - - - - - - - - 290
VIVISECTION - - - - - - - - - 292
THE OCEAN WAVES - - - - - - - - 293
MOON THEORIES - - - - - - - - 298
CAMPHOR MANUFACTURE - - - - - - - 300
CLOVES AND PEPPER - - - - - - - 302
THE SACRED IBIS - - - - - - - - 304
TREELESS JUDEA - - - - - - - - 308
THE MAN OF LITERATURE - - - - - - - 309

THE MAN OF WIT AND HUMOR - - - - - 314
THE DRUIDS - - - - - - - - - 321
NOTED MEN OF THE PAST - - - - - - 323
ECCENTRICITIES OF GREAT MEN - - - - - - 331
ISRAEL PUTNAM - - - - - - - - 332
THE TEMPLE OF THE SUN - - - - - - - 337
SOUNDS AND SILENCE - - - - - - - 339
THE BOTTOMLESS PIT - - - - - - - - 350
ANTIQUITY OF THE BARREL - - - - - - 351
ITASKA LAKE - - - - - - - - - 353
SWIMMING IN SALT LAKE - - - - - - 355
CORAL AND PEARL FISHING - - - - - - 357
GEMS AND PRECIOUS STONES - - - - - - 359
THE WORLD'S GOLD - - - - - - - - 363
PERILS OF THE AERONAUT - - - - - - 365
MIRROR LAKE - - - - - - - - - 371
THE STORY OF AN INVENTION - - - - - 373
FALLS OF THE ZAMBESI - - - - - - - 375
MANUFACTURE OF IRON - - - - - - - 379
THE GRIZZLY BEAR - - - - - - - - 391
HORSE-POWER - - - - - - - - - 396
COLORING MATTERS - - - - - - - - 398
THE JELLY-FISH - - - - - - - - 400
THE CLOCK OF CLOCKS - - - - - - - 404
MANUFACTURE OF OIL-CLOTH - - - - - 406
THE CHIMPANZEE - - - - - - - - 410
THE WANDERING MINSTREL - - - - - - 412
BATHING IN FAMOUS WATERS - - - - - - 415
THE BARBER IN THE EAST - - - - - - 418
COMETS AND METEORS - - - - - - - 421
HAPPY ACCIDENTS - - - - - - - - 433
MILAN CATHEDRAL - - - - - - - - 435
THE CRISIS OF LIFE - - - - - - - 437
PAST, PRESENT AND FUTURE - - - - - - 444

LIST OF ILLUSTRATIONS.

Frontispiece - - - - - - - - 2
Among the Icebergs - - - - - - - - 25
The Journey Across the Ice - - - - - - 33
Galileo in Prison - - - - - - - 53
Napoleon at the Burning of Moscow - - - - 59
Nature's Teaching - - - - - - - 75
Gibraltar - - - - - - - - - 91
The Stickleback - - - - - - - 98
Subterranean Caves - - - - - - - 105
The Juniata, Colorado - - - - - - 113
Upper Falls of the Yellowstone - - - - - 122
Ignis Fatuus—"Jack-o'-Lantern" - - - - - 149
Geysers of Wyoming - - - - - - - 165
Sporting in the Tropics - - - - - - 173
The Bridge of Sighs - - - - - - - 191
Elephants in their Native State - - - - 199
Wetterhorn Mountain, Switzerland - - - - 227
De Soto in the Wilderness - - - - - 239
Paul Gustave Dore - - - - - - - 253
Monastery of San Martino - - - - - 267
The Nightingale - - - - - - - - 275
The Short-tailed Manis - - - - - - 291
Ocean Waves - - - - - - - - - 297
The Sacred Ibis - - - - - - - 305
Ruins of a Druid's Temple - - - - - - 322
Oliver Cromwell - - - - - - - 325
Scene in an African Forest - - - - - - 340
The Wild Cat and its Prey - - - - - 347
Itaska Lake - - - - - - - - - 354
Perils of the Aeronaut - - - - - - 367
Mirror Lake, California - - - - - - 372
Falls of the Zambesi, Africa - - - - - 377
Home of the Grizzly Bear - - - - - - 393
The Jelly-Fish - - - - - - - 401
The Chimpanzee - - - - - - - - 411
Different Kinds of Comets - - - - - 422
Meteoric Shower - - - - - - - - 431
The Great Cathedral, Milan, Italy - - - - 436

THE PROGRESSIVE AGES.

THE TRIUMPHS OF SCIENCE.

IF we look at the history of the world, we shall find that the brilliant age of civilization and enlightenment dates back only about three or four hundred years. The ancient Greeks and Romans of two thousand years ago had, it is true, made some advances in civilization and knowledge, which at that time had raised them above the nations of Christendom; but what was their knowledge when compared with the learned minds of to-day? In many things an humble school-boy of the nineteenth century would utterly confound the logic of a score of ancient expounders, and not half try.

In those days the great teachers like Plato, Socrates, and Demosthenes, taught their pupils orally, and instruction was passed from lip to lip, or written out at enormous expense. Years and centuries rolled away, and the masses remained in ignorance. Books could only be produced by writing and copying with a pen,—a slow and tedious process. It required years of labor to produce a copy of the Bible, and its cost was often equal to that of a good farm. Books were, therefore, only in reach of the rich. The poor could scarcely *think* of their purchase.

Knowledge of the arts and sciences was confined to the few; and consequently its progress was extremely slow and backward. Occasionally there were natural scholars and shining lights in the world, as now; but they had no means of diffusing their knowledge among men. Their grand ideas and noble lectures rarely reached beyond the sound of their voices, and but few persons could be benefited by them. Their brilliant talents and silent thoughts could not be hurled away to the four quarters of the globe by the medium of the newspaper and printed page, to illumine other minds a thousand miles away, and the years came and went, and generation succeeded generation with little apparent change.

Emperors, despots, popes and priests ruled the world for power and profit. The ignorant people who had been taught to receive their word as the only law, tamely submitted to a life of slavery. They dared not think for themselves, and they knew not their God-given rights, powers and privileges. They became willing slaves, "hewers of wood and drawers of water"; willing to work and toil their lives away to suit the wishes of the ruling power, provided they could obtain food and clothing enough to keep the soul and body together. In this way, thousands of years ago, Thebes, Babylon and Jerusalem were built. In this way the pyramids of Egypt and the stupendous works at Palmyra and Nineveh were erected. And in later years the mind and toil and gold of generations were in like manner lavished upon the churches and cathedrals of Europe.

Gradually, however, as age after age passed away, the mind of man began to struggle up from the dark mists of ignorance, and to develop itself. The masses began to look into their situation; and as they studied, thought and reasoned, they saw that they were created equal to their masters, and that their lives were being worn away to enrich and fill the greedy coffers of the grasping and avaricious few.

At length, in 1441, John Guttenberg and Dr. Faust, of Mayence, Germany, came forward with the crowning invention of the modern world. This was the art of printing from movable types; an invention that immortalized their names as the greatest benefactors of the world ever produced. It is true the Chinese claim to have made the discovery several hundred years before, but its use was unknown among enlightened nations, and the two illustrious Germans above named were discoverers and inventors none the less, if they were not the first originators. When the type for a book was once set, hundreds and thousands of copies could be printed at very little cost. Books, pamphlets and papers now began to be disseminated among the people, and teachers sprang up on every hand. The minds of poor laboring men were at once brought in communication with the profoundest minds on the globe; and now commenced the great struggle between truth and error. New scientific theories arose in contradiction to the teachings of those who had formerly been unquestioned. Copernicus denounced the Ptolemaic system of astronomy, and declared the sun to be the center of the solar system. Harvey announced his discovery of the circulation of the blood. Martin Luther raised his protesting voice against the Pope and the corrupted religion of the time. A mighty reformation was begun, headed by noble minds, working shoulder to shoulder at the great wheel of universal progress. Not solely a religious reformation, but a reformation in learning, in art, in science, in everything.

The old school of scientific expounders beheld the new and rapidly rising sects with alarm. In the near future they beheld their doom. The new doctrines were declared false, heretical and dangerous; and every nerve was strained for their overthrow. Copernicus, Galileo and others were arrested and hurried away to prison. Harvey was looked upon as a fool or a madman, and Luther was met with the most determined opposition. Excitement ran high, and in the darkened age of ignorance and fanaticism, imperious and arbitrary rulers established that infernal court — the Inquisition. Thumb-screws, scourges, chains, racks, and every other instrument of torture the hellish ingenuity of man could invent, filled its execution rooms; and the work carried on in the star chambers of this horrid tribunal was well calculated to strike terror to the heart of the strongest mind. In the name of justice, and even holy religion, men were bound upon the cruel rack, with clasps around their wrists and ankles, ropes were attached, passing over windlasses, the executioners took their places, and at a signal the doomed victim was slowly torn limb from limb. The tortures perpetrated upon the victim of the untutored savage of the American wilds was scarcely a comparison to the blood-curdling horrors perpetrated upon the victims of these inhuman monsters, who dared to call themselves men, civilized and religious. The mind sickens at the bare recital. Through the agency of the press the people were informed of the murderous proceedings carried on by their despotic rulers, and they rose in their power and might, and for a time a reign of terror ensued, and the soil of Europe was drenched with blood. But, "Truth crushed to earth will rise again." It cannot be blotted out forever. The spread of printed matter now brought mind in contact with mind, and rending the dark veils of bigotry, ignorance and superstition, flung open the portals to light, truth and knowledge. The press became the great motive power of human progress. All that was known in the arts and sciences was condensed and brought before the world; and the reader or philosopher could in a short time acquaint himself with the logic of the greatest scholars that ever lived. Theories and principles that had been discovered only by lives of patient study were flung abroad on the printed page, and the work of a lifetime grasped and retained by a million minds in a single season. To these were added their own theories and speculations, and the world moved on from discovery to discovery — from darkness to light and truth. America was discovered, the bloody Inquisition swept away, the art of navigation extended, and a thousand inventions studied out. The press became the potent power to link together mind and Nature, genius and enterprise; and the civilized world seemed to leap forward almost miraculously into a higher and nobler state of existence. With the invention of the telescope a new impulse was given to astronomy. The old Ptolemaic theory fell to the ground; and the truths of Copernicus, and Kepler, and Tycho Brahe, and Galileo were demonstrated before a hitherto unbelieving world. The moon was seen with its rugged mountains and towering precipices, coursing round the earth; Saturn with its brilliant rings, Jupiter with its belts and resplendent moons, and Venus, the queen of the stars, traveling round the sun. The fiery comet was seen to dash in among them, and quickly pass away again on its appointed course, paling from sight in the dim and unknown distance, to reappear again only after years and centuries had passed away. Countless millions of worlds appeared in the blue concave overhead. And yet this was but a fragment of Nature. The sublime scenery of the heavens impressed the mind of man with a feeling of wonder, astonishment and awe. He viewed the mighty power of God, and hesitated not to exclaim, "*An undevout astronomer must be mad!*"

About the beginning of the seventeenth century, two children of a spectacle-maker were one day playing in their father's workshop, at Middleburgh, in Holland. Picking up two spectacle glasses and placing one before the other at a little distance apart, they observed by looking through them both that objects appeared inverted, drawn near by, and greatly increased in size. Their father noticed their simple experiment with interest; and fixing two movable glasses on a strip of board, prepared a rude instrument for himself. People flocked in and amused themselves by viewing distant objects through this new contrivance. Their curiosity was awakened; and this rude instrument furnished the ideas and paved the way for the invention of the telescope by Galileo in 1609.

The first instrument of Galileo's was made by enclosing in a tube two spectacle glasses, plain upon one side, while upon the other *one* was spherically *convex* and the other *concave*. Applying his eye to the convex glass he beheld objects appearing three times nearer and nine times larger than to the unassisted eye. Shortly afterward he made another, which gave objects the appearance of being sixty times larger; and ultimately he constructed one which caused objects to appear thirty times nearer and a thousand times larger.

His discoveries in the heavens spread rapidly, and caused intense excitement throughout all Italy. Copernicus had been denounced as a teacher of false doctrine. Galileo proved his theory correct. In other words, he declared that the sun was the center of the solar system; that the planets shone only by the reflected light of the sun; and that the world turned on its axis. This brought him in direct conflict with the teachings of the learned men of the age, who defended the Ptolemaic doctrine, asserting that the earth was the center of the universe, around which the sun, moon and stars daily revolved. They hesitated not in declaring Galileo a false and deluded teacher—a lying heretic. They would not renounce their teachings for this one scientific reformer, and they caused him to be arrested and brought before the Inquisition, that terrible tribunal where, in the name of justice and even holy religion, men where placed upon the cruel rack or engines of torture and inhumanly torn and mangled and murdered. Galileo bore his part well; but he was an old man and he could not die thus. Kneeling upon the crucifix, with one hand on the Bible, he was forced to renounce all. But as he arose he could not help whispering to one of his attendants, "*The earth does move, for all that!*"

Bigotry and ignorance could not quench the fires of truth and true discovery. The worthy senators met in Venice, and Galileo was invited to bring his instrument and prove his theories there. He took his best telescope and erected it upon the summit of the tower of St. Mark. It was a cloudless night. Jupiter, Venus, and the crescent moon shone brilliantly in the clear blue sky. The old astronomer was filled with joy. It was just such a night as he had anxiously hoped and prayed for. The senators gathered around him, and one after another gazed upon the sublime scenery of the heavens. Taking advantage of the situation, he stepped forward and delivered a long lecture, in plain language setting forth the truths of his long cherished theory. With their own eyes they had beheld the wonders the telescope revealed, and they listened to the words of the great astronomer with attention. *That* night carried conviction to the minds of the leading men of Venice. *That* night established the truth of the Copernican theory. *That* night was fatal to the system of the ancient schools.

The science of electricity is at present but very little known; and what astounding discoveries in this important branch await the future world we know not; though with such a universally diffused, all-powerful element, we can scarcely be extravagant in our imagination. It will probably account for a great share of the wonderful feats of jugglers and showmen; it may unveil the mysteries of so-called spiritualism, which the very mediums themselves declare they do not understand; with its magnetic influence it fixes the seal of love upon the youthful brow, and draws heart to heart in fond affection; by its mesmeric power the door of the mind is opened to the brain of another; and as it is everywhere presented it may be used in the future as a means of communication the world over; and who knows but that the time may come when we shall not need wires, when mind can communicate with mind a thousand miles away, by means of this all-pervading medium; when even the *thoughts* of mankind will be known, and such a thing as a secret cannot be kept.

Benjamin Franklin was the first to demonstrate to the world that electricity and lightning were one and the same. While at Philadelphia, in 1752, he constructed a kite of a silk handkerchief, and fixing a bright, pointed wire upon the top, prepared for a bold experiment. A thunder-storm appearing, Franklin brought out his kite and let it rise to a great height. He now tied a key to the lower end of the string, and to *this* he attached a silk ribbon which he fastened to a post and awaited the result. After some time the string appeared as though it were excited by electricity; and as he gently touched the key with his knuckle he received a slight electric shock. The rain now began to fall; and the string becoming wet, bright sparks flashed in profusion from the key. It was an hour of pride to Benjamin Franklin. He was a discoverer; and the light that he in after years threw on this great branch of science made his name justly famous; for it ultimately led to the invention of the electric telegraph.

The smallest inventions sometimes pave the way to the greatest discoveries. Particularly is this the case with the mariner's compass. It is but a minute nautical instrument, working upon a simple law of nature; and yet it has done more for man than all the combined armies that have ever been raised on earth. A thousand years ago, navigation was conducted by the aid of sight alone, and the sun, moon, and stars were man's only guide. The boldest mariner rarely dared venture far beyond the sight of land, for the heavens were at any time liable to be overcast with clouds for days together, and then, without any guide by which to direct his course, he would be utterly lost upon the trackless deep. Hence it was confined to very narrow limits, and the passage of the Mediterranean Sea was looked upon as a great undertaking.

Europe, Asia and Africa, with a few adjacent islands, constituted the whole known world. The circumnavigation of Africa by Necho, and the voyages along its shores by Sataspes and Hanno, were reckoned by the ancients as among the greatest voyages of discovery ever attempted by man. And, indeed, at that time they were; but with the discoveries in magnetism and its application in the invention of the mariner's compass, a new aspect was given to navigation, and new pages recorded in the geography of the world.

The loadstone, which is an ore of iron of a dark color found in various parts of the world, is a natural magnet. If needles or small bits of iron be brought near it, it will draw them instantly to its surface, and hold them there by its own power of attraction. If a piece be fastened to a cork floating upon the surface of a basin of water, it will in a short time settle in a north and south direction; and, indeed, at the time of its introduction into Europe, about the middle of the thirteenth century, it was all there was of the mariner's compass. Even this rude instrument was an unerring guide, and the mariner boldly put out to sea, hundreds of miles from land, without fear. The inventor of this valuable instrument is unknown, though the Chinese claim the honor of the discovery.

A few years since all the cities in the world were nightly buried in darkness, excepting, however, a little spot now and then, where an oil lamp or dingy lantern cast its feeble rays. Illuminating gas was first made in England by Dr. Clayton, in 1739. He filled bladders with it and burned it like a candle for the amusement of his friends; and although he might have speculated upon the benefits following its application, he failed in bringing its notice before the people sufficiently to ensure success. They did not understand the use and benefit the new discovery might confer upon the city. They did not realize that its intensely brilliant flame was to illuminate every street and narrow alley, and turn darkness into day; and for sixty years this important invention was neglected.

A new advocate now came forward. This was Mr. Murdock, who was soon to display its merits to the world. Its first application was in 1792, in lighting his offices and residence in Cornwall. In 1798 he lighted the extensive machine shops of Watt and Boulton, near Birmingham. At the peace of Amiens, in 1802, there was a general rejoicing all over England; and when the sun had set, and the sable curtain of night had been spread, a grand coal-gas illumination was to be made in one of the principal streets of Soho, near Birmingham. The lights were disposed in hundreds of beautiful forms,—in clusters, crosses and crescents,—and thousands from Birmingham came out to witness the dazzling display. That night carried the worth of the discovery to a believing people, and its useful application was thenceforward rapid.

Gunpowder was discovered by Schwartz, a German monk, while engaged in the study of alchemy, searching for the "philosopher's stone," and the "water of life," in the early part of the fourteenth century. It consists of a mixture of seventy-four parts of nitre, ten parts of sulphur, and sixteen parts of charcoal, by weight. The ingredients are carefully mixed, ground in water, pressed, and broken, and then passed through sieves, which give it the form of grains. Its greatest benefit to man is in blasting rocks on the surface and in the mines. In war it is the most powerful agent of destruction; sending with unerring precision from the cannon's mouth the ponderous ball, to tear down solid walls of stone and rend asunder the stout oaken timber of vessels; and by its aid the murderous shell is hurled, to mangle mankind and send them to an untimely grave. It has taken the place of the spear and battle-axe, the lance and the knife, and though there is no humanity *in* war, it is not so bad as it used to be. Let us hope the time is near at hand when the world shall learn the folly of war, and turn to the paths of wisdom, peace and progress. Its explosive force has been calculated at about fifteen thousand pounds upon the square inch confining it.

Through the work of the rising generation we look forward to great inventions in the future. People will study, reflect, and learn ; and depend upon it, the spirit of true progression will never flag. The desire for knowledge is on the increase; and step by step scientific progress is moving forward. A hundred years ago the bare thought of a steam engine had scarcely found a place in the brain of man. Who had dreamed of the electric telegraph, the mowing machine, the sewing machine, and the ten thousand other great inventions that crowd the page of discoveries of the nineteenth century ? No one. The age of genius, enterprise and learning had not developed itself. Great minds have studied, thought, and reasoned all their lives to bring about the present state of human knowledge, and now they arrive at the conclusion that they are taking the first step upon the ladder of progress, and that they have barely learned the A B C of science.

Geology, what do we know of it? In the time to come, if studied in the right direction and with the right spirit, what hidden treasures may it not reveal! These native hills and valleys are literally filled with minerals; whether worthless or not the meditation and brain-work of the future must bring to light. Astronomy, what do we know of it? That our world when compared with the innumerable host that course through the firmament of heaven is but a grain of sand upon the seashore. What is their number? Are they inhabited? What are their destinies? We await the answer of the learned minds of the future. Chemistry, what do we know of it? Just the bare introduction. And even now by its agency we can cause water to burn like wood or coal. What wonders may we not expect future generations to astonish the world with, in respect to this great science! The principles of Natural Philosophy, what do we know of them? Scarcely the A B C. It is true we have great power-looms, steam presses, steam engines, and we navigate the air in balloons; but what are these in comparison to the great hidden powers contained in this branch of science, and which energetic minds are yet to work out? Electricity, what do we know of it? Scarcely anything. It is true we have spanned the ocean with the electric telegraph, and performed a few more little wonders, and it is said we have advanced science so far that we handle the lightning. But what is this? Go to where the great oak, four feet in diameter at the base and with a hundred spreading branches, has been struck by a bolt from the storm-cloud and shivered to splinters. There is a mighty power here, and before it steam and gunpowder pass into comparative insignificance. It pervades all nature. It invisibly surrounds us every day of our lives. It courses through every part of our bodies. Without it we die. Who is going to bring this great power to light? Who is going to handle it? Who is going to utilize it? Ask the generation yet to be. Magnetism, spiritualism, the mind, the eternal soul, what do we know of them? Again comes the answer that our knowledge in this quarter is almost imperceptible. Who is going to solve the dark mystery? Who is going to draw the veil aside and let in the glorious blaze of light and truth, like a mighty revelation, from the portals of heaven? No one answers. Let the millions yet unborn work out the mighty problem.

SCENES IN THE POLAR REGIONS.

EVERY section of the globe furnishes a world of thought and speculation for the contemplative mind of the naturalist. To the student of nature there is not an uninteresting spot on earth. Man was created with a desire for discovery; and within the secret avenues of every thinking brain there is a constant longing to know more—to behold the natural beauties of creation, the wonders and sublimities that bear upon their faces imposing evidence of the almighty power of God—and he is always reaching out, and striving to enter new fields of observation, where new and hitherto unheard of rays of truth and knowledge blaze forth in effulgence, to illumine his understanding and enlighten the world.

The wisest and best informed of the ancient Greeks and Romans had very vague ideas of those regions of the earth which lay far from the neighborhood of the Mediterranean, the Euxine, the Red Sea and the Euphrates. The half-mythical adventures of the Argonauts have most likely a real foundation in fact; but the utmost limit of their piratical voyage was the north-

AMONG THE ICEBERGS.

eastern extremity of what we now call the Black Sea; so that they could not have gone further north than about to the parallel of 40° N. But they, and those who sailed thither after them, brought back strange reports of a people who dwelt much further north, whom they called *Hyperboreans*, "Dwellers beyond the North Wind." According to some accounts, they lived in a land of perpetual sunshine. Other accounts made their land one of almost perpetual darkness. Putting both accounts together, we have what was really the truth: that their year consisted of a day and a night, each lasting for some six months. This theory was incredible to Herodotus, who, in his wide travels, had never seen any such thing. He could not believe that there were people who slept six months at a stretch, and then kept awake for another six months.

The Phœnicians were the most adventurous voyagers of the early ages. Centuries before Christ they had established trading posts upon the African and European coasts of the Mediterranean, whence they made voyages far to the north. They traded with what they called the *Cassiterides*, or "Tin Islands," which probably meant the southern end of Great Britain, and the adjacent islets, whence they brought back stores of that metal, which entered largely into the composition of the bronze which answered many of the purposes for which we now use steel. They were very careful not to let the rest of the world know where were the regions with which they carried on so lucrative a traffic.

In time the Greeks came in for a share in the honors of voyaging and the profits of trade with distant regions. Pytheas, a Hellenic navigator, dwelt at Marseilles, somewhere about the time of Alexander the

Great or his immediate successors — say about 300 B.C. He made at least two long voyages to the far north, of which he wrote accounts, fragments of which have been preserved by later writers. He appears to have sailed along the western and northern coasts of Europe. In one of his voyages he sighted a country which he styles *Thule*, which was most probably Iceland, though some have tried to identify it with Norway or even with Jutland, in Denmark. Some of his reports seemed quite incredible to men of southern Europe. Thus, he says, that after sailing six days beyond Thule, into an unknown sea, he found that daylight did not wholly disappear at any time during the twenty-four hours. Soon after, his progress was impeded by a strange condition of the ocean, which seemed to be "neither water, land nor air, but a mixture of all three; the water being so viscid that the vessel could not make its way through it." To us of this day the matter is clear enough. He had encountered the edge of a floe of "field-ice." Wise geographers of after centuries — such as Strabo and Polybius — set down Pytheas as an arrant liar, and spoke of him much as we speak of Baron Munchausen. But the extant fragments of his narratives show him to have been not only a bold navigator, but a keen and sagacious observer. He was, as far as appears, the first man who determined the latitude of a place by means of the shadow cast by the sun; and he was also quite aware of the preponderating influence of the moon upon the tides.

Most of the early navigators added piracy to their other avocations. Homer speaks of the Phœnician voyagers as being wont to "do all manner of injury to man." The stern rule of the Romans put a check to these marauding voyages. If the Romans plundered the regions which they subdued, they endeavored to put down plundering on the part of others. When the Roman Empire went down, piracy revived. The narrow seas and navigable waters of Europe became so many highways for the Northern Vikings, or sea-robbers. When, after a weary interval of a thousand years, civil society began to be reëstablished, the spirit of voyaging for trade and discovery was again aroused. The voyages of Columbus were at once the cause and the effect of this. His first expedition had for its immediate object the finding of a direct passage by sea for the trade between Europe and the Indies; and when it was found that a vast continent lay straight across the direct route men began to hope that a passage might be found around it. It was assumed that the northern extremity of America, like the southern, terminated, at no very high latitude, in a point or cape, and that by sailing around this the mariner could enter the Pacific, and thence make his way to India by a route shorter than those around Cape Horn and the Cape of Good Hope. To the English and the Dutch such a passage would be of great advantage; for Spain, then in the height of her power, monopolized the trade by the other routes, and made short work with all others who intruded upon the lands and the waters which she claimed as her exclusive possession.

If man was always perfectly contented with his lot and condition he would always remain the same; the progressive spirit that rules the age arouses his ambition and leads him on through patient toil and investigation, to higher and nobler achievements. Hence, even a discontented mind, though it has ruined thousands by leading them in pursuit of objects they never attained, is, after all, the potent lever that is raising the world higher and higher up the sublime hill of science every day.

It was the discontented mind of James Watt that built the steam engine; and of George Stephenson that improved and applied it to the railway. They were not satisfied with what their predecessors had done; they believed they could make an improvement; they studied long and earnestly; they reached ahead; they took the step, and the world knows the result. It was the discontented mind of Christopher Columbus that led him on to the discovery of the New World. After mature deliberation, and years of intense thought and study, he rejected the theories of the learned men of his time and sailed away to establish the enduring truth of his own. It was the discontented minds of Ross, and Franklin, and Kane, that led them to defy the storms and severities of the Arctic winter, and face the dangers of the frozen Polar seas in their attempt of the northwest passage and exploration of the northern regions.

Tropical explorations have revealed to us the tangled jungles and immense masses of luxuriant vegetation, the dark-visaged savage and indolent native; the hissing serpent and loathsome reptile, and the fierce and blood-thirsty beasts of prey, that prowl through the infested forests of the torrid zone. Explorations in the Polar regions have revealed to us scenes in strange and astonishing contrast. And yet the hand of God is displayed in the Arctic regions fully as much as it is in the Tropics. Animated life in these regions are by nature's wise provision fitted and prepared for the rigorous climate by warm coats of fur; and they could not exist for an hour beneath the burning sun of the equator. Animals from the tropical regions transported hither, with only their thin covering of coarse hair, would perish at once, and be frozen to an adamantine mass in less than a single day. Animals are not as numerous or ferocious here as they are in warm climates, but the reindeer, seal, walrus, white bear, etc., abound, and the sable and marten leap through the forests with all the vivacity of the weasel and nimble squirrel of the temperate zone.

About the first of February the edge of the sun is discovered peering above the horizon at some low point between rugged hills of ice and rock. A few minutes only is it visible, and then having passed across the narrow valley, is hid from view behind the intervening hill. For nearly twenty-four hours it sails below the horizon, and then it appears a little higher than before, where it is a little farther across the valley, and the day is a little longer. Gradually it rises higher and higher, day by day, like the thread to a screw, and the days become an hour long, then two, four, eight, fifteen, twenty; and then the sun only dips below the horizon for a few minutes, where some tall dark mountain leans against it, and at last it rises above all, and rides majestically round and round, and for weeks there is only one continual day. Having reached its height, it descends in the same manner that it arose, until it is only seen skimming for a few minutes along the horizon, over some low valley, away to the south, and about the last of November it entirely disappears and the long Arctic night commences. For weary months the dark night is unbroken by a single ray of sunlight; and during this time, when the sky is not overcast with clouds, the moon and stars shine perpetual. The cold is intense, and the Aurora Borealis or Northern Lights flash up and silently pass along the heavens, and flit and glimmer overhead, combining with the pale light of the moon to cast their wandering sickly rays upon the reflecting surfaces of the snow mountains and massive icebergs, giving an apparent slow ghostly motion to all, and inspiring the Arctic navigator with strange emotion, akin to dread and terror.

Among all the different expeditions of Arctic navigators, perhaps none were more fraught with peril and adventure than those of Sir John Franklin. In company with several well educated gentlemen, he left Gravesend, England, on the 23d of May, 1819, and on the 30th of August following, reached York Factory, the principal depot of the Hudson's Bay Company. Having made all necessary preparations, the expedition started on their long river journey into the interior wilderness, on the 9th of September. For forty-four days they continued on their eventful journey, occasionally meeting with wolves and other northern animals, and on the 22d of October they reached Cumberland House, having traveled six hundred and ninety miles. On the 18th of January, 1820, he set out for Fort Chepewyan, in the Athabasca region, eight hundred and fifty-seven miles beyond. The whole distance lay through a wild barren wilderness, almost wholly uninhabited, desolate, and inhospitable. The snow lay deep upon the ground, and the cold wintry blasts swept over the plains and bleak hillsides with unresisting fury. Tracts of pine forests which they passed now and then, roared and wailed in the grasp of the heavy gale; the wind whistled, and the snow sifted down upon them so fast that it appeared almost dark and foggy in the thick woods, reminding them at times of the Alpine storms around the great St. Bernard, and recalling to their minds the old stories they had heard and read about the saving of lost and perishing travelers by the pious monks of the convent and their noble dogs. With the passage of the storm the sun would come forth, but its rays were cold and feeble, particles of frost filled the air, rendering the sky of a dull, hazy color, and great fleecy clouds flew swiftly overhead in the roaring gale. All day long the little party of hardy explorers would toil through the snow, part of the time on foot and part of the time seated in their sledges, wrapped in furs, and drawn briskly over the smooth surface by their faithful dogs. At night a warm or sheltered place was selected for a camp, usually in the thick forest, the snow was scraped from the ground, wood collected and a fire built, a pile of pine branches cut and placed before it for a bed, the dogs were unharnessed from the sledges, supper cooked, the provisions hung on the trees near by, where the wolves could not reach them, and wrapping themselves in their furs and blankets they threw themselves upon their rude couch and prepared to pass the night comfortably, even in the severest weather. In a little more than two months the journey was completed, and they arrived at Fort Chepewyan.

In the spring active preparations were commenced for the advance of the expedition, and on the 18th of July they set forth for Fort Providence, which they reached in eleven days. On the 2d of August they set out for the mouth of the Coppermine river; but after eighteen days of hard traveling they were obliged to establish their winter quarters at Fort Enterprise. Here they passed the long cold winter, the ground covered deep with the icy mantle and the branches of the trees loaded and bent with snow. It was feared that their provisions and ammunition would be

THE JOURNEY ACROSS THE ICE.

exhausted before the long winter passed, unless some one returned for more. Mr. Back, one of the most enterprising members of the expedition, drew on his snow-shoes, and bidding his companions be of good cheer, set out for Fort Chepewyan. He was gone nearly five months, and his friends long believed him lost. No wonder his return was hailed with joy, for he was looked upon almost as one resurrected from the grave. He had passed across the Great Slave Lake, had traveled over one thousand one hundred miles in snow-shoes, and had passed the cold wintry nights in the woods, with no other covering than his blanket and deer-skin. His companions gathered about him, eager to hear his story, and many weary nights he entertained them by recounting the perils and adventures of the lonely journey.

It was the 14th of June, 1821, before the expedition was again on the move. It was a bright, balmy morning as they set forth down the Coppermine, and the grass-covered banks and slopes were lined with herds of deer, musk-oxen, and wolves. At the end of a month's journey they beheld from the summit of a gentle eminence the sparkling waters of the open Polar Sea. On the 21st of July the party embarked in two birch-bark canoes, with provisions for fifteen days. Coasting along the shore, where they could procure game or encamp on the approach of bad weather, they proceeded eastward five hundred and fifty miles, when the approach of winter admonished them to return. It was the 16th of August. Naming the place Turnagain Point, they took their last look of their fartherest exploration, and turned their faces upon the homeward course.

The sufferings and hardships they had experienced were as nothing when compared to the trials that now lay before them. Proceeding up Hood's River they endeavored to shorten their route to Fort Enterprise. Long lines of black ledges lined the stream, and a little farther up, the entire river poured over an immense precipice of rock, two hundred and fifty feet in height, with a roar that seemed to jar the ground. Above this cataract, now known as the Wilberforce Falls, the stream was smaller, rough and unfit for navigation, and the explorers were obliged to leave their canoes and baggage behind, and strike out on foot across the barren wilderness and desolation. It was now the 31st of August. They had proceeded but a short distance when a heavy snow-storm set in, and winter appeared commencing in earnest. They had no means of making a fire, and the weather was so extremely cold they were forced to remain wrapped up in their rude beds for two whole days. At length the weather moderated somewhat, though it was still rough and boisterous, and the little party drew their furs closely around them and plodded slowly on through the deep snow and deeper drifts.

A new terror now stared them in the face. Their provisions gave out, and starvation seemed already whispering a doleful dirge in their ears. Hardly a tree or shrub appeared to gladden the eye or furnish material for building a fire. Cold and desolate marshes, and barren rock-bound hillsides, along which the wind rushed impetuously, bearing clouds of light snow on its raging wings and hurling it into ten thousand drifts, met the gaze in every direction. Almost in despair they toiled on more dead than alive.

On the 26th of September they reached the Coppermine river. The stream was about one hundred and thirty yards wide, and the farthest search revealed nothing but a few rude willows with which to construct a raft to cross. For some time they were busy binding the faggots together, and when they launched their intended float it sank nearly to the water's edge, and without oars or poles, in an unfavorable wind, the raft was useless. Dr. Richardson, with almost superhuman energy, tied a line around his body, and handing it to his friends, plunged boldly into the icy current and endeavored to swim across. If he could gain the opposite shore the frail willow craft could be hauled back and forth and the crossing might be accomplished. But ere he had reached the shore his limbs became numb and powerless, and he sank helpless in the cold water, paralyzed in the congealing tide. His comrades hauled him quickly ashore, rolled him up in warm blankets and placed him before a slow willow fire, and at length he slowly recovered. His effort had been a failure, and had nearly cost him his life.

Their sufferings had become terrible in the extreme. For several days they had had nothing to eat except a few unpalatable lichens, plucked from the cold soil over some frowning precipice. Haggard and woe-begone, they staggered about like gaunt specters or living skeletons, endeavoring with their little remaining strength, to build a canoe of their canvas trappings. The sun just skimmed above the far southern horizon, and then sank to rest after shedding for a short time its cold leaden rays, and the long dark night followed; the heavens, studded with bright stars that glittered and twinkled like sparkling diamonds in the blue concave above, and the silver moon, riding high, seemed to whisper hope, even yet, to the famishing explorers.

On the afternoon of the 1st of October, one of the men staggered in with the antlers and back-bone of a deer, which had died or been killed, probably in the summer. To the starving men it was a prize. Captain Franklin says, "the wolves and birds of prey had picked them clean, but there still remained a quantity of spinal marrow which they had not been able to extract. This, although putrid, was esteemed a valuable prize, and the spine being divided into portions, was distributed equally. After eating the marrow, which was so acrid as to excoriate the lips, they rendered the bones friable by burning, and ate them also."

Three days longer (during which the feeble sufferers talked almost incessantly of the pleasures of eating) and the canoe was finished. The passage of the river was accomplished in safety, and they struck with rising spirits for Fort Enterprise, then only forty miles distant, where Captain Franklin had sent back men on his entering the Polar Sea to await his return. But their hilarity did not last them long. The driving snow and keen, frosty air seemed to pierce the very marrow of their bones. The last remains of their old worn-out shoes and scraps of leather had been eaten, and again they were famishing with hunger. In despair two of their number sank down utterly exhausted, and perished in the snow.

At length they came to a spot where a few sickly lichens grew, and here a portion of the men declared they could go no farther. Franklin and seven others pushed on, promising assistance as soon as it could be obtained. The distance was now twenty-four miles, and ere he reached it four more men had sank exhausted by the wayside. It was on the evening of the 11th of October that the captain and four worn and weary men staggered up to the fort. With the exception of a single meal of miserable lichens, not a morsel of food had passed their lips for five days. Here, at last, they expected relief. Imagine their feelings when, on entering the fort, they found it silent, desolate, and deserted!

Mr. Back, who had preceded them, had reached the house two days previously, as was indicated by a note which he had left, and had gone in pursuit of the Indians, from whom he hoped to obtain assistance. With faltering steps the starving party proceeded to collect the bones and skins of deer that had been killed at the time of their residence there the previous winter, and prepare them for food. The bones were pounded, the hair singed from the skins, and the whole boiled to an acrid soup, which rendered their mouths sore, and sickened them to a sad degree. Day by day it sustained their lives; it was their only food. What will not man resort to, to satisfy the pangs of hunger in the last stages of starvation! For eighteen days they lived thus, and no relief came. On the evening of the 29th, as they sat around the fire trying to look on the bright side of their now almost helpless situation, Dr. Richardson and Hepburn, whom they had left in an exhausted state some three weeks before, entered — in amazement they gazed upon each other. Hepburn had just killed a partridge. The doctor seized it, tore out the feathers, held it for a few moments before the fire, and divided it among the men. Like hungry wolves they ravenously devoured it; for it was the first morsel of decent flesh they had tasted for thirty-one days. Richardson and Hepburn had a tragic story to tell, which we will not attempt to lay before the reader. Neither will we attempt to portray the suffering and misery that followed. Reduced as they were, they became still more so. They moved about like grim, melancholy specters, hollow-eyed and almost fearful to look upon. Their voices became hoarse, husky, and hollow, scarcely above a whisper, and one after another they sank to rise no more. At length, on the 7th of November, the long-looked-for aid arrived. Three Indians came loaded with provisions, and the little band, almost on the verge of the grave, was saved. Perhaps no more touching scene was ever witnessed than that of the starving survivors, with streaming eyes, offering up their prayer of thanksgiving for their timely deliverance.

After having become sufficiently recruited, they proceeded on their homeward journey. At length they reached the coast and sailed for England, where they arrived in October, 1822. Thus terminated the first journey of Dr. Franklin. He was born an explorer. The perils he had experienced did not deter him. He sailed again, and again beheld the icy regions of the north. His enthusiasm finally carried him too far, and he came back no more. Experienced navigators followed, and his remains were found in 1859. His ships were frozen in the ice, and his men had perished. The naked and ghastly skeletons told their silent, melancholy tale more forcibly than human lips could utter. The northern ocean, during the long Arctic night, when the Aurora flashes silently across the sky, lighting up the moving mountains of ice that crash and jar against each other with the thunder of an earthquake, produce a scene never to be forgotten by the bold mariner. The scenery in the far frozen seas, where Perry, Kane, McClure, and Hall, dared the surrounding dangers, amid the mighty workings of nature, forms a subject ever fraught with interest.

INDIA-RUBBER.

ONE day in the year 1833 a man by the name of Charles Goodyear, of the firm of A. Goodyear & Sons, hardware merchants in Philadelphia, chanced to have business which required his presence in the city of New York for several days. While there he happened to pass the store of the Roxbury India-Rubber Company. He had read much of the utility of the then recently invented India-rubber life-preservers, and, his curiosity being aroused, he entered the store, and after a short talk purchased a life-preserver and carried it with him to Philadelphia. Soon after his return he failed in business and became heavily involved in debt.

While examining the life-preserver, several months afterward, an improvement in the manner of inflating it occurred to him, and he hastened to New York for the purpose of laying it before the agent of whom he had purchased, with a view of selling his right to the improvement, and thus hoping to realize a sum which would be sufficient to pay his debts and set him on his feet once more.

The agent, however, had a sorry tale to tell him. The first pair of India-rubber shoes ever seen in this country were brought here from South America in 1820. Until 1823 they were handed about merely as a curiosity, when a shipment of five hundred pairs, soon followed by another of five thousand pairs, was made.

These shoes at once sold for a very high price, not less than sixteen dollars per pair. This price, together with the wonderful cheapness of the material of which they were made, had the effect of creating, as it were, an India-rubber mania, similar to the petroleum mania which occurred some thirty years later, and by which so many were ruined. One of the most important results of the mania was the formation of the Roxbury India-Rubber Company, before mentioned, with a capital of three hundred thousand dollars. But they encountered new and tremendous difficulties, for it was found that the shoes would not stand the climate of our northern winters; an exposure to a cold at which water would congeal would render them as hard and as brittle as glass, while a temperature of one hundred degrees would convert them into a mass of sticky gum. In short, the agent said that unless some way of remedying these two evils was found, the Roxbury company, as well as all other companies of the same kind would soon become bankrupt.

This catastrophe did occur a short time after this conversation, to the ruin of hundreds of prominent business men in New York and elsewhere, and with it died out all interest in the manufacture and utility of India-rubber, except in the mind of one single individual, and that individual was Charles Goodyear, bankrupt iron merchant, and a native of Massachusetts.

On his return to Philadelphia, Mr. Goodyear began his experiments. He purchased a few pounds of India-rubber. He melted it, he pounded it, he rolled it, he kneaded it; in fact he manipulated it in every imaginable manner, but all to no purpose.

He read about it; he talked of it with professors and physicians and other learned men; he pondered upon it by day, he dreamed of it by night, but without success. He mixed it with magnesia, turpentine, alcohol, and tried every way imaginable to gain his object, but the substance presented the same difficulties as before. Once he thought he had succeeded by mixing quicklime with the gum. He made a few specimens of cloth, which presented an elegant appearance. But he soon learned, to his dismay, that the weakest acid, such as orange juice, dropped upon the cloth, at once changed it to its original condition. One morning as he was going to his shop he met an Irishman, in his employ, who was highly elated, having, as he thought, discovered the process so much sought for. He had on a pair of pants which he had dipped in a barrel of gum. They were nicely covered, as with a varnish, and for a few moments Mr. Goodyear thought that perhaps Pat had blundered into the secret. The man sat down on a stool to his work, and in a few moments, on attempting to rise, found himself glued to his seat, with his legs stuck tightly together. He had to be cut out of his pants, amid the laughter of the by-standers.

Thus Charles Goodyear struggled on, sometimes in a debtor's prison, always without provisions for a week ahead, for five years. Then it was that he made the simple discovery which has rendered India-rubber so useful to the world. It was as follows: Take a piece of common sticky gum, sprinkle a little sulphur on it, put it in an oven heated to a temperature of two hundred and seventy degrees, and bake it for a short time. It comes out retaining all its good qualities, and having wholly lost its liability to harden in cold or melt in warm weather. He found, by subsequent experiments, that by varying the quantity of heat he could make it as hard as ivory or as flexible as whalebone.

After this discovery the interest in the manufacture of India-rubber goods revived, and the business has now swelled to one of immense magnitude. For instance, a single firm in New York, engaged in the manufacture of rubber belting, annually sells two million dollars' worth of belts. During the late civil war more than four million India-rubber blankets were supplied to the soldiers of both armies.

An interesting account is given by Robert Cross of the methods adopted in Brazil for obtaining the gum from the India-rubber trees. We glean a few facts therefrom:

"In the investigation of this subject I traveled over a wide extent of flat forest country, much divided by miry hollows and tidal *gapos*, which stretched along the bank of the river Guama. Although this river is three times as broad as the Thames at London bridge, it is not to be seen on any ordinary map. In the region alluded to there were hundreds of trees wrought by different collectors, each of whom had a separate piece of land to work on.

"The collectors begin to work immediately at daybreak, or as soon as they can see to move about among the trees. They say the milk flows more freely and in greater quantity at early morn. I do not attach much importance to this statement, but I have recorded it. Another and more probable reason is, that as the rain often falls about two or three o'clock in the afternoon, the tapping must be done early, as, in the event of a shower, the milk would be spattered about and lost. The collector, first of all, at the beginning of the dry season, goes around and lays down at the base of each tree a certain number of small cups of burnt clay. At the lesser trees only three or four are put, but at the larger ones from eight to twelve are deposited. The footpaths leading from tree to tree are likewise cleared of sapling growths, and the bridges over the *gapos* formed at each place by the trunk of a tree are, where necessary, replaced.

"On proceeding to his work the collector takes with him a small ax for tapping, and a wicker basket containing a good-sized ball of well-wrought clay. He usually has, likewise, a bag for the waste droppings of rubber and for what may adhere to the bottom of the cups. These promiscuous gatherings are termed *sernamby*, and form the 'negrohead' of the English market. The cups, as already stated, are of burnt clay, and are sometimes round, but more frequently flat or slightly concave on one side, as to stick easily when, with a small portion of clay, they are pressed against the trunk of a tree. The contents of fifteen cups make one English imperial pint.

"Arriving at the tree the collector takes the ax in his right hand and, striking in an upward direction as high as he can reach, makes a deep upward-sloping cut across the trunk, which always goes through the bark and penetrates an inch or more into the wood. The cut is an inch in breadth. Frequently a small portion of bark breaks off from the upper side, and occasionally a thin splinter of wood is also raised. Quickly stooping down he takes a cup and, pasting a small quantity of clay on the flat side, presses it to the trunk, close beneath the cut. By this time the milk, which is of dazzling whiteness, begins to exude, so that, if requisite, he so smooths the clay that it may trickle directly into the cup. At a distance of four or five inches, but at the same height, another cup is luted on, and so the process is continued until a row of cups encircles the tree at a height of about six feet from the ground. Tree after tree is treated in like manner, until the tapping required for the day is finished.

"On the following morning the operation is performed in the same way, only that the cuts or gashes beneath which the cups are placed are made from six to eight inches lower down the trunk than those of the previous day. Thus, each day brings the cups gradually lower, until the ground is reached. The collector then begins as high as he can reach, and descends as before, taking care, however, to make his cuts in separate places from those previously made.

"Going from tree to tree, at a sort of running pace, the collector empties the contents of the cups into a large calabash, which he carries in his hand. As he pours the milk out of each cup, he draws his thumb or forefinger over the bottom, to clean out some which would otherwise adhere. Indeed, a small quantity does remain, which is afterward pulled off, and classed as *sernamby*. The cups, on being emptied, are laid in a little heap at the base of each tree, to be ready for the following morning. The trees occur at various distances, from ten to one hundred yards apart, and as I traveled over the intricate network of muddy footpaths, I continually felt perplexed and surprised that the natives have not yet seen the advantages that would be derived by forming plantations, whereby more than twice the quantity of caoutchouc might be collected in one-fourth the time, and at far less cost and labor.

"The best milk-yielding tree I examined had the marks of twelve rows of cups, which had already been put on this season. The rows were only six inches apart, and in each row there were six cups, so that the total number of wood cuts within the space of three months amounted to seventy-two. It grew close to a *gapo*, only eight inches above high-tide mark, and, being a vigorous tree, the cups were usually well filled; but with two years or so of such treatment the tree would probably be permanently injured. It is a common report that the trees yield the greatest quantity of milk at full moon."

WHAT PATENTS HAVE DONE.

PERHAPS no branch of industry can be selected that has a more direct bearing on the interests of all classes than the making of books and newspapers. And what has been the agency of patents in the development of this single art, identified with the intellectual, moral and material welfare of the entire community? Commencing with the paper; it was cheapened three cents a pound by the invention of Watt and Burgess in 1854, which consisted in boiling wood pulp in caustic alkali under pressure.

As concerns the type, David Bruce, Jr., by machines patented in 1843, reduced the cost fully twenty-five per cent; he used a pump to force the molten type-metal into the molds to secure a sharp, clear letter on the type, and for the production of some varieties enabled steam-power to be used. Then, as to printing, the press used by Franklin over a century ago gave but one hundred and thirty impressions an hour, but to the year 1847 successive patented improvements brought the capacity of newspaper printing up to from twenty-five hundred to fifty thousand impressions an hour, the former of large, the latter of small newspaper size. This was the famous Napier double cylinder press, an English invention. It was believed that with this machine the limit of speed was reached; that if a newspaper's circulation should exceed twenty thousand copies daily, all the type, presses, and appointments of the printing office, as well as the force of compositors, pressmen, proof-readers, and others, would have to be doubled. And all this time the public were calling for more newspapers, more books, more periodicals, more printed matter generally. It was at this time that R. M. Hoe produced his great improvements in printing machinery, now so well known. In the year 1861 one of the New York journals printed a daily edition varying from 115,000 to 130,000 copies, and this was printed in four hours and a half. To have done the same work on a Napier press would have required five additional forms of type, each at a cost of one thousand dollars per week, making five thousand dollars per week, or $260,000 per annum in type alone in this one newspaper office, to say nothing of additional presses, room, and workmen, that would have been required by the Napier presses. During the fourteen years immediately following, Hoe sold forty of his great presses, and the gain to the public may be fairly estimated from the instance above given.

After the papers are printed they must be folded, and this was formerly done by hand. About the year 1859 Cyrus Chambers began a series of inventions for doing this by machinery, and in 1874 he had brought into use seventy-two of his patent "newsfolders" for folding newspapers. The cost of running these machines was

$2 a day each, and each accomplished the work of five men. The same work by hand cost $8.75 per day, being a saving of $6.75 per day for each machine, and these newspaper folders alone, during the original term of the patent, effected an economy of labor amounting to upwards of one million one hundred and sixty-five thousand dollars. But this, like the improvements in paper-making, in type-founding, and in printing, extended far beyond the production of newspapers.

During the same period the paper-folders for duodecimo publications saved in labor more than $139,000; for quartos more than $64,000; and for thirty-two-mos, more than $532,000,—making from one patent alone, in less than fourteen years, a saving of human toil and exertion amounting to more than two million two hundred and forty-three thousand dollars; and the economy is to continue and increase for all time, never to be diminished, but likely to be increased by added improvements called forth by the encouragement of the patent laws.

Turning to other patents relating to articles of general use, we find universally the same results. We can all recollect the time when feminine fashion called forth immense quantities of tempered steel wire for crinolines. At the outset the wire cost three dollars a pound, because in tempering it was necessary to wind the flat wire in volute coils kept apart by interlaced iron wires, the coils being thus carefully heated in a furnace, and then plunged into a hardening bath. In August, 1858, Henry Waterman patented a plan of drawing the wire lengthwise from the fire through the hardening liquid, and by this means reduced the cost of hardening from three dollars a pound to three cents. As a result the steel skirt, instead of being the fanciful luxury of the rich, was brought within the reach of the poorest. But, far from this, the method has been found available, with this economy, in the manufacture of tempering wire for the manifold purposes of manufacturers and engineering.

The copper-toed shoe is a well known example of the economy brought about through patents. The saving to this country is estimated at from six millions to twelve millions annually. The superintendent of a "Home for Little Wanderers" certifies that it reduced the cost of shoes for the children in the establishment from one thousand dollars a year to four hundred.

Patents for improvements relating to shoes for horses are equally instructive. To make horseshoes by hand costs an average of sixteen cents each, without counting the cost of the iron. So far back as 1835 Henry Burden began the invention of horseshoe machinery, and in 1857 patented what is claimed to be the first really successful apparatus,— although some of his previously patented devices were included in it,— and in 1871 horseshoes were sold, iron included, at four and a half cents each, the shoes weighing on an average one pound each. The absolute benefit to the public cannot be calculated, but the gain to the government during the late war amounted to four millions of dollars. And the same motives which led Henry Burden to his long continued and finally successful efforts,— the reward offered by the patent laws,— is urging other inventors to still further improvements in the same line at the present time.

GALILEO.

THE Copernican theory, which Tycho had labored in vain to supersede, was next received and supported by an Italian philosopher, whose name and history are inseparably interwoven with the progress of astronomy. That illustrious individual, Galileo Galilei, usually known by his christian name, was born at Pisa, in 1564. His father, a Tuscan nobleman of small fortune, caused him to be educated for the profession of medicine at the university of his native city. While studying there, he became deeply sensible of the absurdities of the philosophy of Aristotle, as it had then come to be taught, and he became its declared enemy. That spirit of observation for which he was so distinguished was early developed. When only nineteen years old, the swinging of a lamp suspended from the ceiling of the cathedral in Pisa, led him to investigate the laws of the oscillation of the pendulum, which he was the first to employ as a measurer of time. He left it incomplete, however, and it was brought to perfection by his son, Vincenzo, and particularly by Huygens, the latter of whom must be regarded as the true inventor of the pendulum. About this period Galileo devoted himself exclusively to mathematics and natural science, and in 1586 was led to the invention of the hydrostatic balance. In 1589, his distinction in the exact sciences gained for him the chair of mathematics in his native university, where, immediately on his installation, he began to assert the laws of nature against a perverted philosophy. In the presence of numerous spectators, he performed a series of experiments in the tower of the cathedral, to show that weight has no influence on the velocity of falling bodies. By this means he excited the opposition of the adherents of Aristotle to such a degree that, after two years, he was forced to resign his professorship. Driven from Pisa, he retired into private life; but his genius being appreciated in another part of Italy, he was, in 1592, appointed professor of mathematics at Padua. He lectured here with unparalleled success. Scholars from the most distant regions of Europe crowded round him. He delivered his lectures in the Italian language instead of Latin, which was considered a daring innovation.

During eighteen years which he spent at Padua, he made many discoveries in natural philosophy, which he introduced into his lectures, without regard to their inconsistency with the doctrines previously taught. Among these may be mentioned his discovery of the rate of descent in falling bodies; certain improvements on the thermometer; some interesting observations on the magnet; and a number of experiments relative to the floating and sinking of solid bodies in water. In 1609, hearing that one Jansen, a Dutchman, had made an instrument by which distant objects were made to appear near, Galileo, whose mind was prepared for the discovery, instantly conceived on what principle it was constructed, and, without losing a day, he fashioned a similar instrument with many improvements; such was the origin of the telescope, the most interesting of all instruments connected with science.

Turning his optical tube toward the heavens, Galileo perceived the moon to be a body of uneven surface, the elevations of which he computed by their shadows; and the sun to be occasionally spotted; and from the regular advance from east to west of these spots, he inferred the rotation of the sun, and the inclination of its axis to the plane of the ecliptic. From a particular nebula, which his rude instrument enabled him to resolve into individual stars, he even conjectured, what Lord Rosse has but recently proved, that the whole Milky Way was but a vast assemblage of stars and systems. He discovered that the planet Venus waxed and waned like the moon, that Saturn had something like wings by its sides (afterward found to be a ring), and that Jupiter was surrounded by four satellites. It is now altogether impossible to imagine the wonder and delight with which these discoveries must have filled the mind of a philosopher like Galileo, who had perhaps long surmised that all was not as it seemed in the heavens, but despaired of ever being able to penetrate the mystery. In the year 1611, while entering upon his investigations, he was induced, by the invitation of his prince, the Grand Duke of Tuscany, to return to Pisa, and resume the chair of mathematics there, with a large salary. It was consequently at that city that he first gave his discoveries to the world. That persecution which had only been suspended by accident in the case of Copernicus, now fell with full weight on the head of the Italian philosopher. Having openly declared, in a work which he published, that his discoveries proved the truth of the Copernican theory, he was denounced by the clergy as a heretic, and obliged, in 1615, to proceed to Rome, and appear before the court of Inquisition, who obliged him to promise that he would never more broach such dangerous doctrines. It has been stated, but is not quite certain, that he was on this occasion imprisoned by the Inquisition for five months, and that he would have suffered still more severely if the Grand Duke had not interceded for him.

GALILEO IN PRISON.

For several years he observed the silence enjoined upon him, but continued to pursue the study of the true theory of the heavens. Panting to make known to the world a complete account of the system of Copernicus, yet dreading the prejudices of his enemies, he fell upon the expedient of writing a work, in which, without giving his own opinion, he introduces three persons in a dialogue, of whom the first defends the Copernican system, the second the Ptolemæan (or that of Aristotle), and the third weighs the reasons of both in such a way that the subject seems problematical, though it is impossible to mistake the preponderance of arguments in favor of Copernicus. With this great work, which is still held in reverence, Galileo went to Rome in 1630, in the sixty-sixth year of his age, and by an extraordinary stretch of favor, received permission to print it. Scarcely had it appeared at Rome and Florence, when it was attacked by the disciples of Aristotle, and most violently of all by the teacher of philosophy at Pisa. A congregation of cardinals, monks, and mathematicians was appointed to examine his work, which they unhesitatingly condemned as highly dangerous, and summoned him before the tribunal of the Inquisition. This blow fell heavily on the head of Galileo, now an old man, and left defenceless by the death of his friend and patron, Cosmo II. He was compelled to go to Rome in the winter of 1633, and was immediately immured in a cell in one of the prisons of the Inquisition. There he remained for several months, when, being brought before an assembly of his judges, he was condemned to renounce, kneeling, before them, with his hand upon the gospels, what were called the "sinful and detestable errors and heresies" which he had maintained. The firmness of Galileo gave way at this critical moment of his life: he pronounced the recantation. But at the moment he rose, indignant at having sworn in violation of his conviction, he exclaimed, stamping his foot, "*E pur si muove!*"—("It still moves!") Upon this dreadful relapse into heresy, he was sentenced to imprisonment in the Inquisition for life, and every week for three years was to repeat the seven penitential psalms; his "Dialogues" were also prohibited, and his system utterly condemned. Although Galileo was in this manner sentenced to confinement, it appeared to those who judged him that he would not be able, from his age, to endure such a severe punishment, and they mercifully banished him to a particular spot near Florence.

Here Galileo lived for several years, employing his time in the study of mechanics and other branches of natural philosophy. The results are found in two important works on the laws of motion, the foundation of the present system of physics and astronomy. At the same time he tried to make use of Jupiter's satellites for the calculation of longitudes; and though he brought nothing to perfection in this branch, he was the first who reflected systematically on such a method of fixing geographical longitudes. He was at this time afflicted with a disease in his eyes, one of which was wholly blind, and the other almost useless, when, in 1637, he discovered the libration of the moon. Blindness, deafness, want of sleep, and pain in his limbs, united to embitter his declining years; still his mind was active. "In my darkness," he writes in the year 1638, "I muse now upon this object of nature and now upon that, and find it impossible to soothe my restless head, however much I wish it. This perpetual action of mind deprives me almost wholly of sleep." In this condition, and affected by a slowly-consuming fever, he expired in January, 1642, in the seventy-eighth year of his age. His relics were deposited in the church of Santa Croce, at Florence, where posterity did justice to his memory by erecting a splendid monument in 1737.

Galileo is represented by his biographers as of diminutive stature, but strong and healthy, of agreeable countenance, and lively conversation and manner. He preferred living in the country, where his relaxations consisted in the cultivation of his garden, and in the company and conversation of his friends. He loved music, drawing and poetry; and is said to have been so fond of Ariosto, that he knew the whole of the "Orlando" by heart. He had few books. "The best book," he said, "is nature." A complete edition of his works, in thirteen volumes, appeared at Milan in 1803, the style of which is natural and fluent, so elegant and pure that it has been held up by competent judges as a model of classical Italian. "Altogether," says Professor Playfair, "Galileo is one of those to whom human knowledge is under the greatest obligation. His discoveries in the theory of motion, in the laws of the descent of heavy bodies, and in the motion of projectiles, laid the foundation of all the great improvements which have since been made by the application of mathematics to natural philosophy. If to these we add the invention of the telescope, the discoveries made by that instrument, the confirmation of the Copernican system which these discoveries afforded, and lastly, the wit and argument with which he combated and exposed the prejudice and presumption of the schools, we must admit that the history of human knowledge contains few greater names than that of Galileo."

NAPOLEON'S PASSAGE OF THE ALPS.

THE page of history has never recorded greater examples of generalship than that displayed by Napoleon Bonaparte. Every age produces its great men — men who seem to be born for the occasion, and as they move forward the whole nation instinctively moves with them. Napoleon was one of these. He was born to command. His mind was powerful and far-seeing, and notwithstanding the defamatory assertions of his enemies, the whole galaxy of enlightened statesmanship affords not a more brilliant star. He has been denominated a merciless tyrant, a lover of war and carnage, and an ambitious, blood-thirsty demon. In considering whether to give credence to the above assertions, we should take into account the source from whence they sprang. Napoleon sided with the people, and the Bourbons, nobles and aristocracy of combined Europe rose in arms against him. They flooded the world with books and publications calculated to defame his character, and arouse the feelings of mankind against him. The English nation was his most bitter and unrelenting foe; especially were they loud in their assertions against him. Comparatively but few people of our country can read French, and even the press of that country has been somewhat controlled by the Bourbons. Nearly all can read English, and as many works from that country are imported or reprinted, and scattered among the masses, a wrong impression is often produced.

In studying history we should seek for facts and avoid partiality. We should read it carefully, noting the conditions that prompted the events, weighing well the acts, and then, according to the dictates of our reason and judgment, award the praise to whom it is justly due. The English did not like Washington. They had a motive — he fought against it. They did not like Napoleon. They had a motive — he fought against England. That Napoleon was ambitious no one can deny; he was extremely ambitious; but he was not the cruel tyrant he has been depicted. He respected the poor as well as the rich; he ate, slept, and conversed with his soldiers, sharing with them their toils and hardships, and they almost idolized him. Herein was the secret of his great success. Probably no man ever possessed more courage, energy and determination than he did. He could foresee the result of a battle and plan for future movements and events with astonishing accuracy; and when the order came the soldiers sprang to their work with alacrity, for they well knew if it was carried out to the letter they moved but to victory. Nothing that was within the bounds of possibility ever deterred his dauntless spirit.

One of the greatest achievements of modern times is Napoleon's celebrated passage of the Alps. He had recently arrived in France from his expedition to Egypt. Mighty armies were rushing upon his country on either hand. The powerful English navy swept the seas triumphantly everywhere, and blockaded every port. From the north the Austrian Marshal Krey was pressing down upon them with a well-disciplined army, 150,000 strong, while Italy and the eastern frontiers of France were being menaced and overrun by another Austrian host under Melas, 140,000 in number.

NAPOLEON AT THE BURNING OF MOSCOW.

Something must be done or France would be destroyed. With his accustomed promptness and vigor he issued a brilliant proclamation, setting forth the situation and calling upon the people to come to the rescue of their country. His words resounded throughout the nation like trumpet-notes of alarm, and 150,000 brave soldiers at once responded to his call. Placing these under Moreau, who was to take charge of the campaign on the Rhine, he placed *himself* at the head of 60,000 men, made up from fragments of old regiments, new recruits, etc., and commenced the march into Italy.

Many of the men composing Napoleon's army were young and inexperienced, and nearly two-thirds of them had never witnessed a regular engagement. It would not do to meet the formidable array of Austrians in a pitched battle under such circumstances, and what could not be done by force must be accomplished through stratagem. He at once formed the bold resolution to climb the Alps and descend upon their rear.

Veteran officers heard his plan with amazement, and shook their heads in doubt. They believed the undertaking beyond their power of accomplishment. They beheld in their imagination the trackless precipices, the icy crags, the murderous avalanche, and they shuddered at the prospect. What was barely possible to the single traveler must be impossible for an army of 60,000. But the arguments of Napoleon at length prevailed; and in spite of the ridicule of the surrounding nations at what they believed the mad and foolish attempt of an over-ambitious commander, they reached the frontiers of France.

Before them was the mighty Alpine barrier. Up from the green, grassy meadows at their feet they rose until they seemed to pierce and mingle with the silent clouds. It was early in May, 1800, when the expedition started, and the green fields, bedecked with the bright blossoms of early spring flowers, presented a strange contrast to the bleak and forbidding aspect before them. But Napoleon was with them in their hearts, with words of cheer inspiring their inmost beings with courage and fortitude, and they pressed on into the dark gorges at the foot of the mountains with spirit and alacrity.

Before long they commenced to ascend the narrow, rocky path that wound around the precipitous mountain-side and along the edge of the huge ledges, where to look down would cause the head to swim with dizziness, and the moving host was obliged to march in single file. The ponderous cannon wheels were taken from the axles, and being slung on poles, were carried forward by the men. Pine logs were split and hollowed out, and the heavy guns being placed therein, were drawn up the steep ascent by long rows of mules in single file. For hours they toiled on, up the cheerless, slippery path, the air becoming more cold and piercing, and the way more rugged, bleak and barren, and one by one the hardy mules gave out and sank from exhaustion. It was more than the faithful animals could endure. But the advancing host must not stop to muse upon the horrors and difficulties of the undertaking, for confusion and dismay might pervade their ranks and the enterprise be wrecked at the outset. With hearty good will the men stepped in the places of the fallen mules, and with their own shoulders in harness, a hundred men to a gun, pushed forward with renewed energy, onward and upward.

Napoleon had done all that mortal man could do to lighten the difficulties of the dangerous passage. He had sent forward companies of mechanics and blacksmiths to take apart and repair the gun-carriages and vehicles of transportation, loads of the best provisions to feed the hungry, and hospital tents and attendants to receive the sick and wounded. The men appreciated his kindly foresight, and felt willing to endure all for his sake and for their country.

The scene now became one of wild and awful grandeur. They were entering the regions of eternal snow. All around them rose icy peaks and snow-capped summits, with murderous crags and yawning chasms, where the wild mountain goat could scarce obtain a foothold, and where the foot of man had never dared to tread. Below them were stretches of dark and somber forests of pines and firs; but before they reached their elevated situation they were stunted and blasted by the frosts of an eternal winter, and bleak desolation swept the cheerless mountain pass.

Away to the westward, in the direction of the setting sun, lay the beautiful fields and blooming gardens of their own France, bathed in the golden rays of celestial glory. Far beyond, on the distant confines of the horizon, the blue hills and hazy outline bounded the limits of vision. Gradually they were vailed in the dusky shades of twilight, while yet the noble orb of day cast a cold, slanting ray upon the silent snow-peaks that towered majestically above. A few moments it lingered, creeping higher and higher, to the very summits of the surrounding peaks, sending back its sparkling reflections from glistening masses of frozen snow and ice, while the wind howled and roared as it swept mercilessly over the bleak pinnacles, bearing clouds of light snow swiftly on its angry bosom, and then it was gone.

The order came to halt as they reached an elevated valley between the Alpine ridges, and the weary soldiers crept close to their bivouac fires, and drawing their great cloaks close around them prepared to pass the dreary night. Before the sun gilded the surrounding peaks the army was again astir and defiling up the winding passage. Experienced guides went before with long poles to mark the path over the deep drifts of driving snow, and the army, lengthened out in single file, slowly followed. Great caution was required in treading the uncertain and treacherous path, as it wound along the edge of the frightful precipice, where a single misstep would precipitate a human being upon murderous crags a thousand feet below. Walls of rock rose upon the other hand almost perpendicularly, until they seemed to pierce the clouds. The water falling from the crevices congealed along the side of the cold rock, forming huge, glittering icicles, and away above, immense masses of snow and ice jutted out like fields of impending doom. The eagle started from his aerial perch, and, screaming, wheeled and plunged down — far down into the depths of the dark and somber forest below. A low, muffled rumbling was heard, and a vast mass of snow and ice was seen sliding down the steep mountainside, gathering force and power as it proceeded, rending tree, and rock, and ledge, and bearing them swiftly on its agitated and angry bosom, leaping over precipices hundreds of feet in height, and striking the ground beyond, rending it as though with an earthquake shock, and with all its accumulated debris take the last great plunge over the narrow pathway, with the crash of thunder, to strike among the crags of the dread abyss a thousand feet down ; there to scatter its boulders and splintered timber, and send up its clouds of snowy spray. Woe to those who stood within its reach in that dread moment. They were borne on the wings of the upheaving tide and buried below, there to sleep until the archangel's trump shall call the dead to judgment.

The brave men looked on with consternation and trembled with awe and terror. The bugle sounded the charge to enliven their spirits, and they pressed on again over the dangerous pass, and up to still more elevated ground. As they glanced up to the airy summit of the high granite wall upon the one hand, with its great, black, cavernous openings and pendent, overhanging rocks, and noted the white fleecy clouds in the blue firmament moving, as it were, directly against it, the entire mass seemed moving over upon them as if to engulf them in one grand overthrow and destruction. The glance below would cause the head to swim and the heart to flutter.

Onward and upward, from danger to danger, the path led them, until they emerged from the perilous ascent, and, entering the valley of Desolation, stood upon the summit of their journey. Before them, upon the bleak, desolate plain, near the foot of still higher peaks, stood the famous convent of St. Bernard, eight thousand feet above the level of the sea, and the highest spot on the continent of Europe where humanity dwells. One vast scene of desolation, cold, bleak and cheerless, met the view. As they marched past the convent the monks came out and presented each soldier with a slice of bread and a cup of wine. The column was about twenty miles in length, all told, and with such order and precision did the monks execute their work that no halt was made, and not a single man left the ranks.

The descent was even more perilous than the ascent had been. The horseman pulled his horse down the slippery steep after him, where a tumble or misstep would bring him down upon him, and perhaps sweep half a score of men into eternity. Their mangled corpses among the broken rocks at the foot of the wild gorge to lay forever silent; their bones to bleach, surrounded by the most bleak and somber aspects of nature, where the foot of man could never reach them. The wind howled among the branches of the stunted Alpine firs, sending up little clouds of light snow that moved over the dark forest like specters of the gloomy solitude. The low rumble of some distant avalanche now and then reached the ear, its muffled, jarring thunder striking a feeling of terror to the hearts of those who heard it, while the peal of the bugle rang out in startling distinctness, echoing from rock to rock and from crag to crag in deafening detonations, as they passed over some dangerous place, and wound slowly down the perilous way.

At length, after four days, the army emerged from the rugged pathway and stood in proud martial array upon the sunny plains of Italy. The Austrian General, Melas, received the news with alarm and consternation. The great battle of Marengo followed. Napoleon was the victor and France was saved.

ALCHEMY AND CHEMISTRY.

FOR more than a thousand years the art of alchemy captivated many noble spirits, and was believed in by millions. It is generally understood to express the "occult art," or the changing by some chemical process the base metals into the most precious. Some give it a more comprehensive signification, and trace in the name that of the modern science which succeeded it. The distinguished English chemist, Dr. Thompson, goes still further, and calls it "the knowledge of the substance or composition of bodies; so named from the Arabic substantive *Kiyamon*, that is, the substance or constitution of anything, from the root Kama."

From Arabia (where it is supposed to have originated) alchemy passed into Europe; and from the eleventh to the sixteenth century inclusive it was in the highest estimation, and numbered among its votaries many men whose names are still distinguished for their learning. In this period were discovered many valuable chemical compounds, and the uses to which they can be applied. Basil Valentine, a benedictine monk of Erfurt, in Germany, appears to have been possessed with the true love of science. He discovered antimony, and was familiar with the medicinal preparations of it now in use. His works describe correctly the modes of preparing nitric, and muriatic and sulphuric acids.

It must be admitted, however, after all, that the principal objects to which the labors of the alchemists were directed were not those of genuine science. The search for gold and the means of obtaining it cheaply, made them untiring pioneers in this unexplored region. For centuries they worked assiduously to discover the *alkaless*, or universal solvent. In this they failed, but they discovered the acids described by Basil Valentine, which almost answer the purpose. They sought, for many generations, the philosopher's stone, which should transmute the base metals into those more precious. It eluded their search, but they brought up from the deep unknown a vast number of new facts, that have proved of more value to mankind than the mysterious stone could ever have been. So they found not the *elixir vitæ*, which should cure all diseases and prolong life indefinitely; but they discovered much that relieves mankind of pain and sickness, and thus adds to the enjoyment of the allotted span of life. Though they worked blindly to accomplish selfish ends, the result of their labors was the clearing of the field and preparation of the ground for the grander and more universal science of chemistry.

A most unfortunate accident, which has occurred at Prague within a few months, recalls, in many of its details and circumstances, the quaint traditions that were once prevalent in regard to the accidents that overtook the mediæval alchemists. Professor Fischer, of the Prague gymnasium, a young man only twenty-five years of age, and of the highest eminence in his profession — that of chemistry — has come to an untimely end under the most melancholy circumstances. No one needs to be told that cyanide of potassium, a drug largely used in photography, is a poison of the most deadly character. Its active ingredient is prussic acid. Prussic acid in its pure, or, as chemists would term it, "anhydrous" form, is a substance too dangerous to be kept or even manufactured. If a capsule containing a wine-glass full of pure prussic acid were broken in the pit of a theater, those among the audience who were nearest the doors might escape, but the great majority would be killed on the spot. The prussic acid ordinarily sold, and occasionally used for killing dogs and cats, contains a drop of the pure acid to a quarter of a pint of water. Pure prussic acid no chemist dare keep. He might as well compress a ton of dynamite into a single cartridge, supposing such package to be possible, and then leave the deadly package lying loose on the table.

Cyanide of potassium is not, like prussic acid, volatile. It is a white powder, rather resembling flour or chalk. It is, however, so poisonous that a mere pinch of it sprinkled over an open wound or sore, will cause almost instantaneous death; that a fragment almost imperceptible to the eye will, if swallowed, prove equally fatal; and that its mere smell has before now produced instant death. It was, it seems, the ambition of Prof. Fischer to discover some means of rendering cyanide of potassium harmless. We can do this with gunpowder — though the analogy is not strictly exact — means employed with gunpowder being mechanical, while those for which Prof. Fischer sought were chemical. We know what happens if a light is applied to a keg of gunpowder. If, however, we mix the powder with four or five times its bulk of saw-dust, a torch may be applied to it with impunity. The mechanical resistance of the sawdust makes it impossible for the explosion to at once spread to the whole mass, and the consequence is that a sort of splutter ensues, like that of a squib or bluelight. Professor Fischer's idea was that if cyanide of potassium were thoroughly mixed with sal ammoniac, it would be as harmless as gunpowder mixed with sawdust, but would still remain equally available for all those purposes of photography for which it is at present absolutely indispensable.

In the course of his researches Mr. Fischer made a mixture which, in his own mind, he felt assured would meet the conditions of his problem. He compounded the cyanide with some other substance, and then, turning to his laboratory assistant, said:

"Science has not so far advanced as to be even able to render harmless so dangerous an agent as cyanide of potassium."

With these words he tasted the mixture, and was almost in an instant seized with the most violent and excruciating agonies. He at once implored his assistant to send for medical aid. Cyanogen, however, whether as prussic acid or cyanide of potassium, kills almost instantaneously. In a few seconds Professor Fischer was beyond help. We are told that there is no possible reason to suppose that a deliberate suicide had been planned and carried out under the mask of experiment. On the contrary, there is every reason to believe that the Professor has met the fate which befell only too many of the early chemists and their predecessors — the alchemists.

We know now what will happen to any experimentalist if he dips blotting-paper in nitric acid, washes it out, and then incautiously treads upon it. What happened to the man who is believed — for his record perished with him — to have first discovered fulminate of silver is a matter of scientific record. That he was engaged in researches upon the fulminates, and more especially upon the fulminates of the higher metals was well known. How it precisely came about that he disappeared as he did, will remain a matter of conjecture. There came one day a puff, a slight shock and a sharp noise, as if some one inflated a paper bag and then burst it between his hands. Of the professor himself, of his laboratory, of his apparatus and of much less within a radius of some yards, not a vestige or trace was left.

So it used to be with the alchemists — the inheritors of the hidden wisdom of Bohne, and Roger Bacon, and Albertus Magnus. They were always blowing themselves up, or asphyxiating themselves with some noxious vapor. For a man who knows nothing, or next to nothing, of chemistry, it is a very dangerous game, indeed, to mix together a couple of substances of which he knows nothing and then bray them in a mortar. Common sulphur is harmless stuff enough, so is charcoal, so is niter; but let an ignorant man mix the three and apply a light to them, and the result will much astonish him.

When of old an alchemist was reduced to fragments in this fashion our ancestors had an easy explanation. He was a magician, they used to say, and the devil had come suddenly and carried him off. There was a time, between the days of Roger Bacon and those of Davy, Black and Cavendish, when the foul fiend was thus always carrying off alchemists. We know not how it happened. If a man goes into a chemical laboratory and takes up a big beaker and pours into it the contents of the first two bottles that are ready at his hand, the probabilities are that he will be reduced to atoms for his careful consideration.

Apart from the sad fact that a young man with a bright and brilliant future before him should be thus suddenly cut off, the death of Professor Fischer has another moral. Chemistry — whatever Mr. Lowe may have to say in praise of civil engineering — is the science of the world and of the future. The bridge which takes the engineer years upon years to construct, the chemist can, in so many sixteenths of a second, reduce to atoms.

Chemistry has given us the balloon ; it has put in our hands gunpowder, nitro-glycerine, dynamite and, above all, fulminate of gold, an explosive so terrible that if an ounce of it be left in a stoppered bottle, its grains falling among themselves by their own weight will create a convulsion sufficient to lay a city in ruins. It has given us poisons so subtle that were we to employ such means of warfare, we could sail in a balloon over the camp of the enemy and drop upon it a shell, the bursting of which would kill every human being within a mile of its range.

Then, too, chemistry has given us disinfectants. To the chemist we owe carbolic acid, chloride of lime, and permanganate of potash. Chemists have taught us to disinfect our sewers and drains, to ventilate our houses, to burn gas instead of oil, and to light our streets with what is more powerful than gas itself — the electric light. It is to chemistry, indeed, that we owe almost all the comforts of everyday life.

But, on the other hand, the possibilities of chemistry are almost too terrible to be contemplated. As the science at present stands, any student can, if he have access to a well stored laboratory, carry away in a pill box sufficient to lay New York in ruins or to poison the whole community of its inhabitants. The chemist can, as every schoolboy knows, convert water into ice in the center of a red-hot crucible. He can construct a shell, the size of a cricket-ball, which will explode the moment it touches the water and overwhelm in flames a hostile fleet. Indeed, the chemist reduces the world to its original and primal elements. For him, even more than for the engineer, nothing is impossible. And yet his power, vast as it is, is limited. He can more easily destroy than construct. He can take life, but he cannot give it. He can level the city with the plain, but he cannot build it again. He can create prussic acid, but he is ignorant of its antidote. He is like the fisherman who rashly opened the vessel sealed with the ring of Sulieman Ben Daoud. The forces at his control are beyond his command; the powers he can evoke he cannot lay. But men, in striving to gain much, do not always overreach themselves; if they cannot arrive at the inaccessible mountain-top, they may perhaps get half way toward it, and pick up some scraps of wisdom and knowledge on the road. The useful science of chemistry is not a little indebted to its spurious brother, alchemy. Many valuable discoveries have been made in that search for the impossible, which might otherwise have been hidden for centuries yet to come. Roger Bacon, in searching for the philosopher's stone, discovered gunpowder, a still more extraordinary substance. Van Helmont, in the same pursuit, discovered the properties of gas; Geler made discoveries in chemistry which were equally important; and Parcelsus, amid his perpetual visions of the transmutation of metals, found that mercury was a remedy for one of the most odious and excruciating of all diseases that afflict humanity.

Let us not, in the pride of our superior knowledge, turn with contempt from the follies of our predecessors. The studies of the errors into which great minds have fallen in the pursuit of truth can never be uninstructive.

As the man looks back to the days of his childhood and his youth, and recalls to his mind the strange notions and false opinions that marked his actions at the time, that he may wonder at them, so should society for its edification look back to the opinions that governed the ages fled. He is but a superficial thinker who would despise and refuse to hear of them because they were absurd.

No man is so wise but that he may learn some wisdom from his past errors, either of thought or action; and no society has made such advances as to be capable of no improvement from the retrospect of its past folly and credulity.

NATURE'S TEACHINGS.

IN a curious and instructive book, entitled "Nature's Teachings," by Mr. Wood, it is shown that scientific inventions, no matter how original and ingenious they may appear to be, have each and all been anticipated in the world of nature.

Countless inventions have been made by man without his having any knowledge of the fact that the machine which in its first idea sprang from a single brain, and was afterward, during the progress of time, slowly improved and perfected perhaps by many successive generations of inventors, had been in use in nature, in a more perfect form than art could accomplish, for ages before man existed on the earth. There is scarcely a principle or part in architecture that has not its natural parallel — walls, floors, towers, doors and hinges, porches, eaves and windows; thatch, slates and tiles, girders, ties and buttresses, bridges, dams, the pyramid, and even mortar, paint and varnish, are all there. The Eskimo snow-house is an exact copy of the dwelling the seal builds for her tender young; the wasp's nest is composed of several stories supported on numerous pillars. The well known instance of the building of the Crystal Palace on a "new principle," by Sir Joseph Paxton, is mentioned by the author, and is one of the many cases where man has confessedly copied nature in art; for that beautiful structure of iron and glass is simply an adaptation of the frame work of the enormous leaves of the Victoria regia plant, which, owing to its formation, combines great strength with great apparent fragility. The present Eddystone light-house, which has so long withstood the force of the waves, was constructed in 1760 by Smeaton on an entirely new idea, the model being taken from a tree-trunk, and the stones of which it was built being strengthened by being dovetailed into one another, as is the case with the sutures of the skull.

The study of the eye of man, as well as of birds, quadrupeds and insects, has shown how the most beautiful and gradually improved inventions, such as the telescope, microscope, pseudoscope, stereoscope, multiplying glass, etc., had already been perfected in nature for ages. By the combination of a few prisms and a magnifying glass is produced that most wonderful of all optical instruments, the spectroscope, which equally reveals to us the constituents of the most dis-

NATURE'S TEACHINGS.

tant stars or the coloring matter of the tiniest leaf; and yet the prismatic colors developed by this marvelous instrument have existed equally within the glorious arch of the rainbow and in the tiniest dew-drop as it glitters in the rising sun, ever since the sun first shone and the first rain fell. In the arts of peace we must look to the animal world for the most perfect specimens of tools for digging, cutting or boring. No spade is equal to the foot of the mole; and our hammers and pincers look clumsy indeed beside the woodpecker's beak or the lobster's claw. Moreover, the dwellings in the construction of which such tools are employed are models of beauty and ingenuity. Symmetrically shaped pottery, made of molded mud or clay, is found in nature in the form of birds' and insects' nests; in the jaws of the skate is found the crushing-mill, and in the tooth of the elephant the grindstone. In the ichneumon-fly and the grasshopper was perfected from the first the modern agricultural improvement on the hand-dibble, the seed-drill. It is only of late years that the use of the teasel has been superseded by machinery; and brushes and combs, buttons, hooks, eyes, stoppers, filters, etc., are all found in nature. The principle of the diving-bell and air-tube exists in varieties of insects; birds make beds and hammocks and even sew, and the bower-bird emulates us in the construction of ornamental bowers and gardens. Graceful fans exist in plants and insects, cisterns in the traveler's tree and the camel's stomach, and natural examples of the balloon and parachute. In other varieties of art, nature has stolen a march on man; certain insects make paper of different textures; the art known as "nature-printing" was anticipated in the coal measures. Star-stippling, as now used in engraving to produce extra softness of effect, exists in utmost perfection in every flower petal. The caddis-worm, common in all our fresh waters, constructs for itself a circular window-grating which admits the water and yet protects the pupa from injury, an apparatus exactly like the wheel-windows of a Gothic building. There is a bird in South Africa, the sociable weaver bird, which may be looked upon as a dweller in cities, each pair, up to the number of perhaps three hundred, building their own nest; while the whole community unite to form a common roof or covering of thatch made from a coarse kind of grass, to protect their habitations from the heavy tropical rains. The driver-ants, also found in Africa, are so sensitive to the fierce heat of the sun that when, on their march, they are obliged to cross open ground, they construct, as they go on, a light gallery which looks very much like the lining of a tunnel, stripped of the surrounding earth; and if they come to thick grass, which makes a shelter for them, they take advantage of it, and only resume the tunnel when they emerge on the other side. They are called driver-ants because they drive before them every living creature. There is not an animal that can withstand the driver-ants. In their march they carry destruction before them, and every beast knows instinctively that it must not cross their track. They have been known to destroy even the agile monkey, when the swarming host had once made a lodgment on its body, and when they enter a pig-sty, they soon kill the imprisoned inhabitants, whose tough hides cannot shield them from the driver-ants. Fowls they destroy in numbers, killing in a single night all the inhabitants of a hen-roost, and, having destroyed them, have a curious method of devouring them.

The Rev. Dr. Savage, who has experimented upon these formidable insects, killed a fowl and gave it to the ants. At first they did not seem to pay much attention to it, but he soon found that they were in reality making their preparations. Large parties of the insects were detached for the purpose of preparing a road, and worked with an assiduity which seems to be a characteristic of these energetic insects. Numbers of them were employed in smoothing the road to the nest by removing every obstacle out of the way, until, by degrees, a tolerably level road was obtained. They are possessed of strength which seems gigantic, when compared with their size, carrying away sticks four or five times as large as themselves, and never failing to pounce upon any grub or insect that might happen to be lurking beneath their shelter.

Meanwhile the other ants were busy with the fowl. Beginning at the base of the beak, they contrived to pull out the feathers, one by one, until they stripped it regularly backward, working over the head, along the neck, and so on to the body.

Not less wonderful than any of these are the Trap-door spiders. In making their nests they begin by sinking a shaft in the ground; it is then lined with a silken web, and closed by a circular door, which can scarcely be distinguished from the moss and lichens which grow around. The hinges are most exactly fitted, and the spider has an extraordinary power of closing his door from the inside, and resisting all intrusion. It is curious that as we advance in the scale of creation these wonderful dwellings cease. Strange to say, the creature which roams at will through the forest, and has no settled resting-place, is higher in the scale of life — according to the recognized scheme of naturalists — than the animal that is mechanically capable of constructing the most perfect abode!

Mr. Wood reminds us that though the march of science has destroyed much of our belief in the sweet old tales of fairy-land, yet she has given us ample compensation, inasmuch as the "fairy tales of science" are in reality more full of grace and poetry than any of the myths that delight our childhood.

And many of the forms which meet us, if we apply ourselves to the study of natural history, are more full of quaint or graceful fancy than the wildest tales that have ever stirred the imagination of an Eastern story-teller. What can be more beautiful than the little Velella, a sea-creature like a circular raft, with an upright membrane answering to a sail; "semi-transparent, and radiant in many rainbow-tinted colors." What more grotesque than the Archer-fish, which possesses the curious power of feeding itself by shooting drops of water at flies, and very seldom fails to secure its prey; or the Angler-fish, which is endowed by Nature with a rod and bait ready adjusted. This remarkable creature has an enormous mouth; on the top of its head are certain prolonged cane-like filaments, beautifully set in a ring and staple joint, so as to turn every way; and at the end of these singular appendages is a little piece of flesh, which when waved about looks like a worm, and attracts the fish, which is then ingulfed in the huge jaws of this natural angler.

Many interesting forms come to us from the water-world, suggestive of rafts, boats, oars, and anchors. An insect called the Water-boatman is itself both boat and oars, besides being its own passenger; the legs with which it rows are fashioned in most exact resemblance to the blade of an oar; or we should rather say that the blade of an oar resembles the leg of this Water-boatman. The fragile creature the Portuguese Man-of-war, which traverses the surface of the ocean like a bubble, and can at pleasure distend itself with air and float, or discharge the air and sink, shows us the principle of the life-dress in which Captain Boyton made his daring passage across the English Channel. Cables, too, we have in plenty; the Pinna, a kind of mussel, anchors itself to some rock or stone with a number of silk-like threads spun by itself; and the Water-snail moors itself, perhaps to a water-lily leaf, by means of a gelatinous thread, slight, almost invisible, yet very strong, which it can elongate at pleasure. In connection with this there is a very curious account of a spider, which shows a marvelous power of adaptation. Its wheel-like net was in danger from a high wind. The spider descended to the ground, a depth of about seven feet, and instead of attaching its thread to a stone or plant, fastened it to a piece of loose stick, hauled it up a few feet clear of the ground, and then went back to its web. The piece of stick thus suspended, acted in a most admirable manner, giving strength and support, and at the same time yielding partly to the wind. By accident the thread became broken, and the stick, which was about as thick as an ordinary pencil, and not quite three inches in length, fell to the ground. The spider immediately descended, attached another thread, and hauled it up as before. In a day or two, when the tempestuous weather had ceased, the spider voluntarily cut the thread and allowed the then useless stick to drop. The plan here adopted by the spider is frequently followed by fishermen who, during stormy weather at sea, ride out the gale by attaching the boat to the yielding nets.

It is natural to expect that in the art of war and self-defense nature should show us an infinite variety; and man has not been slow in using his powers to adapt the same principle to his own use. If man has armed himself with spears or daggers, if he has dug pitfalls or set traps in hunting, his most deadly contrivances are but feeble adaptations of the weapons, offensive and defensive. with which nature has endowed her offspring. We are prepared to find the serpent's fang a terrible instrument; and we are not surprised that the piercing apparatus and sheaths of gnats and fleas, or the lancets of mosquitoes when magnified, are dangerous and bloodthirsty; but it is curious to find how many of these deadly weapons belong to the vegetable world. The sword-grass has a notched blade which, when magnified, is almost exactly the same as the shark-tooth sword of Mangaia. There are nettles whose sting is sufficiently venomous to cause violent inflammation, cramp, and even death; and it is well known that some of the most graceful plants, such as Venus' Fly-trap, which is common in the Carolinas, and the Drosera or Sundew, one of the British plants, are in fact nothing but skillful traps to catch and digest unwary insects.

Some of the most curious of natural defenses are those which simulate some form quite different from the true character of the creature. We are tempted to think of the Mighty Book of Michael Scott, in which was

> Much of glamour might,
> Could make a ladye seem a knight,
> The cobwebs on a dungeon wall
> Seem tapestry in lordly hall.

And nature, in her turn exercising her powerful glamour, can make a caterpillar seem a twig, or a moth look exactly like a withered leaf. The Spider-crab might be taken for a moving mass of zoöphytes and corallines, so thickly is its shell covered with extraneous growths. The leaf-insects are so exactly like leaves that the most experienced eye can scarcely distinguish them from the leaves among which they are placed. We must all have noticed other instances in which the colors of insects, and also the plumage of birds, harmonize in a wonderful way with the scenes in the midst of which they are placed. Indeed there seems no end to the resemblance which may be traced between the works of nature and those of man. Many of the most obvious of these strike us with fresh surprise when we find the comparison carefully drawn out. What a freak of nature, for instance, are the aphides — the milk-cows of a species of ant; or the tailor-bird, which sews leaves together by the edges, and makes its nest inside them! It is sufficiently strange, too, to remember that the elaborate process of paper-making was carried on by the wasps ages before it was known to the Chinese.

One of the most powerful of all natural forces is that of electricity; and it is at present so little understood, and so full of mystery, that we may perhaps suppose that many of the most important discoveries of the future must lie in that direction. But nature has known how to turn this as well as her other powers to her own use. She has her living galvanic batteries, such as the torpedo and the electric eel, both of which secure their prey by paralyzing it with their electric discharges. And the light of the glow-worm and that of the fire-fly, though hitherto it has been a puzzle to naturalists, may, there is little doubt, be referred to animal electricity.

We are convinced that the more closely the connection between nature and human inventions is observed, the more perfect and the more numerous will further discoveries be. Endowed with high moral capabilities of truth, and justice, and benevolence; gifted with reasonable faculties, which enable him to observe, to argue, to draw conclusions, it is for man himself to work according to the same laws which, unconsciously to themselves, govern the organizations of the lower animal and the vegetable world.

MORE THAN ONE UNIVERSE.

GAZING through the immeasurable profundities of space at such a sublime object as the Great Nebula in Orion, one feels a desire at least to know, if possible, *something* about the distance of that vast congeries of suns; to know if it can be expressed, if not in millions, at least in billions, or trillions, or in quadrillions of miles. But these figures convey no idea to the mind. In order to obtain even a general and partial idea of the reality of the awful gulf of space which separates those mysterious worlds from any sun in this part of the universe, we must drop such little units of measurement as our mile and year, and resort to tests more expressive. The only adequate measure, for such supracosmical distances, is the motion of light itself. This motion is at the rate of twelve million miles a minute. *That* is too great a fact for any full realization of the actual meaning; but hold it, for a while, steadily, and grasp its full measure, if possible.

Light — even the light of those great suns — in traveling from the Nebula in Orion, is so far absorbed in its stupendous flight through the celestial spaces, that nothing less than the very best telescopes can reveal to the eye of a terrestrial observer the fact of the existence of those far worlds. And the light of the Nebula in Orion, flashing out at that incomprehensible velocity, cannot reach the eye of any one on our globe within a period of less than sixty thousand years! Twelve million miles a minute! Seven hundred and twenty million miles, or nearly eight times the distance of the sun from the earth, in a single hour! Think of *that* lightning-like rate for a month — for a year — for a hundred, a thousand years — for sixty thousand years! The mind itself recoils, aghast, and rebels at such unthought-like thoughts. It is ready to declare that creations placed at distances so infinite must be outside the universe. What, then, must be the distance — what the dimensions, of that inconceivable universe of suns and systems, which is known to astronomers as the Great Nebula in Orion! — an object so infinitely remote that it appears but as a faint spot upon the sky. However it may be with those unspeakably distant aggregations of worlds and systems, the nebula — whether they have some common bond of union with the nearer infinity of stars that we can see and which we call the universe — however that may be, one great discovery has now been pretty conclusively confirmed and established. What that audacious universe-explorer, Herschel, found after years of unwearied search and labor, is more recently proved to be undoubtedly a fact; the *whole visible universe of stars is moving through* *space.* Not one is stationary. Every central sun, including our own comparatively small and inconspicuous ruler, and all the glittering host of heaven, with that measureless and bewildering galaxy of suns called the Milky Way, are all forever sweeping on, in periods which stun the imagination, around some one great central orb.

The unimaginably distant universes called nebulæ, generally too remote to permit even light itself — the light of their central suns — to reach us here, even through the telescope, in any other shape than a pale, confused blur, or fog — these nebulæ are not visibly included in this grand movement of the universe of which our solar system forms a part. They are, if a paradox may be permitted where nothing else will convey the idea, separate universes. Ours, the entire visible universe, is included in this mighty revolution of which we have spoken; a revolution around some one central world, or sun.

Where, and what, is that mysterious, that mighty world — that grand central sun? Is it "the way where *light* dwelleth?" Is it the place where God dwells? *His* home, O fellow mortal, is everywhere. Let him not be excluded from your heart nor mine. For this is a truth which is uttered by the one great poet of his time — and a deeper and more significant truth than the world understands — when in The Higher Pantheism, he exclaims: "Speak to Him thou, for He hears, and Spirit with Spirit can meet — *Closer is he than breathing, and nearer than hands and feet.*"

But where is His central sun? — that star of glory ineffable, around which all visible worlds are revolving? Have the universal labors of those lonely midnight sentinels on the watchtowers of science, the astronomers, revealed at last the direction in which it lies? Yes! — and they have done more. They have found the particular cluster, or constellation, in which it shines — for it can be seen from our Earth — and have even ascertained, beyond a question, the identical star itself. It is the one central orb around which are silently wheeling all the visible host of heaven. We have not here the space to explain, in succession, the Titanic problems and obstacles with which the astronomers have boldly and successfully grappled, in their determination to pierce the secret of stellar motion. Herschel first and boldest — then, after a half-century interval, Argelander of Bonn, and the Struves, father and son, of Russia, and finally and chiefly, Maedler — all these have resolutely taken a patient and determined part in the discovery of these sublime laws of the universe. It was a mighty work, for so puny a creature as man — a mere atom on the flying world where his insect-flash of life in the physical body is passed; living on a planet that is swiftly revolving on its axes, and flying in its orbit round a central luminary that is itself, as the truth now appears, speeding almost on the wings of light in harmonic union with a mighty and unnumbered brotherhood of suns and systems, round some conjectural center whose very existence now first began in these investigations to suggest itself; thus situated, the aspiring earthly investigator, while participating himself in all these motions, and finding also the necessity of allowing for still other motions, which nothing but the attempt to obtain stellar parallax could have revealed — thus situated and encompassed with difficulties, how resolute must be the philosopher who would seek to resolve these high mysteries of the universe. Yet these gigantic obstacles have been, one after another, overcome; man has actually measured the distances of some of the miscalled fixed stars. A thousand years has not been a period of duration sufficient to measure the flight of those sunbeams, in its flashing speed to our invisible little world, though that flight was accomplished at the rate of twelve million miles a minute. These far suns are all found to be in swift motion, revolving in orbits immeasurable, and our own solar system is sweeping on with the rest. The exact direction in which our sun is going has been determined; it is going at the rate of nearly 34,000,000 miles a year toward a certain star in the constellation Hercules. The distance of that star is such, that its light only reaches us in a period of forty-six years at least; hence, it will require a period, for our system to reach that star, of 1,800,000 years.

This step was but a part of the problem. The central constellation is not there. Long years of patient and careful labor, repeatedly corrected for all possible errors, led Maedler at last to the desired spot — the mysterious center of the revolving universe. He had expected that the great center would be located within the limits of some rich star cluster; he was not disappointed. Led at first to the conspicuous red star Aldebaran, he was forced to abandon that, because of its own too rapid motion — a motion swifter than that of its nearest neighbors, and showing it to be nearer than they. Other tests must be tried; more years of investigation must pass, before the central secret stands revealed. At last, it has been found. One star, of all the glittering host of heaven, fulfills perfectly the required conditions. Around that far orb, mysterious alike in its distance and its attractive power, revolve all the visible suns and systems of space — our own, of course, included. Let us behold that governing star. On any clear night, at this time of the year, at any hour after dark and before midnight, turn your gaze to the upper eastern sky, and there you will see the well-known sparkling cluster of the Pleiades. At eight o'clock, now, it is almost at the zenith. In that glittering group, spoken of by Job of old, the unassisted eye usually detects seven stars. Keener eyes can count twelve; and some, of eagle glance, have discerned fourteen. A good telescope reveals the constellation as consisting of hundreds of flashing suns. Central in that sparkling cluster is the mysterious king of suns: a sun ineffable. It is the star Alcyone! Around that far world all the heavens are revolving. It is the center of gravity. It may not always have been so. It is so now. "It is at present the sun about which the universe of stars composing our astral system are all revolving." "Just where the swiftest motions should be found, there," says Mitchel "they actually exist! either demonstrating the truth of the theory, or exhibiting the most remarkable and incredible coincidences." The conclusion of that great astronomer confirms that of the European astronomers who had been working out this stupendous problem: the central sun has been found. It is a constellation enormously distant, but by no means so remote as some others whose distance has been in a general way computed. As to this part of the problem, we end with a quotation from the lofty spirit we have named Mitchel: "The known parallax of certain fixed stars gives to us an appropriate value of the parallax of Alcyone, and reveals to us the distance of the grand center. Such is the enormous interval separating the sun from the central star about which it performs its mighty revolution, that the light from Alcyone requires a period of five hundred and thirty-seven years to traverse the distance! And if we are to rely on the angular motion of the sun and system, as already determined, at the end of 18,200,000 years this great luminary, with all its planets, satellites and comets, will have completed *one* revolution around its grand center!"

BOTTOM OF THE OCEAN.

THE discoveries made by the Challenger exploring party in their seventy thousand miles research, and investigations five miles below the surface of the ocean, are of a very interesting nature to the lovers of science. Professor Huxley, who was of the party, says that some of the discoveries which have been made by the Challenger are undoubtedly such as to make us all form new ideas of the operation of natural causes in the sea. Take, for example, the very remarkable fact that at great depths the temperature of the sea always sinks down pretty much to that of freezing fresh water. This is a very strange fact in itself, a fact which certainly could not have been anticipated *a priori.*

Take, again, the marvelous discovery that over large areas of the sea the bottom is covered with a kind of chalk, a substance made up entirely of the shells of minute animals — a sort of geological shoddy made of the cast-off clothes of these animals. The fact has been known for a long time, and men were greatly puzzled to know how the substance collected there.

But the researches of the Challenger, he says, have proved beyond question, as far as he can see, that the remains in question are the shells of organisms which live at the surface and not at the bottom, and that this deposit, which is of the same nature as the ancient chalk, differing in some minor respects, but essentially the same, is absolutely formed by a rain of skeletons.

These creatures, the professor thinks, all live within one hundred fathoms of the surface; and being subject to the fate of all living things, they sooner or later die, and when they die their skeletons are rained down in one continual shower, falling through a mile or couple of miles of sea water. How long they take about it imagination fails one in supposing, but at last they get to the bottom, and there, piled up, form a great stratum of substance which, if upheaved, would be exactly like chalk. Here we have a possible mode of construction of the rocks which compose the earth of which we have had previously no conception.

Another important fact was the discovery that animal life exists at all depths of the ocean. The idea has been prevalent heretofore that there are no animals at the great depth of five miles, but the dredgings of the Challenger brought to light species of animals never before seen, which has put at rest the queries as regards the possibility of animal life existing at the wonderful depth above mentioned.

The bottom of the sea is an enchanted country; the animals, its inhabitants, are self-luminous; they thunder upon their enemies from a distance; they harden themselves into stone.

We read that Daphne was transformed into a laurel. The narrators of this fable have not depicted for us the sufferings of that unfortunate maiden, her languor, the

GIBRALTAR.

growing numbness of her limbs, her feet dried up and spreading into long roots, her arms shaping into branches covered with a polished bark. But this dream is realized in the ocean every moment. There is no region with a favorable climate and an agreeable site, where animals are not found living in colonies, and working, by their petrifaction, at the construction of rocks and reefs of an immense extent.

Heat favors their development. No part of the world presents them in the same marvelous variety as the great ocean and the Indian seas. If we direct our gaze into the liquid crystal of the Indian ocean, we shall there see realized the most wonderful dreams and fairy-tales of our childhood. Fantastic bushes bearing living flowers, the massive structure of the meandrina and astrea contrasting with the branchy tufts of the explanaria, which blossoms in the form of cups, with the madriporidæ, of elegant structure and ever-varying ramifications. Everywhere throughout this region the eye is charmed with the brilliancy of color; delicate shades of sea-green alternating with browns and yellows, rich purple tints passing from the most vivid red to the deepest blue; nullipores, yellow or pink, delicately touched as the peach, covering decaying plants with a fresh development of life, and themselves enveloped with a black tissue of retipores resembling the most delicate carvings in ivory.

Near by wave the yellow and lilac fans of the gorgona, worked like jewelry in filigree. Strewed over the sandy bottom are thousands of sea-stars and sea-urchins of the most curious forms and varied colors. The flustra, the eschara attached to branches of coral-like mosses and lichens, and the patellidæ striped with yellow and purple, look like great cochineal insects on the ground. Then the sea anemones, looking like immense cactus-flowers, brilliant with the most glaring colors, adorn the clefts of the rocks with their waving crowns, or spread out their blooms, till the sea-bottom resembles a border of many-colored ranunculuses. Around the coral-bushes play the humming-birds of the ocean — brilliant little fishes, now sparkling with metallic red or blue, now with a golden green, or with the soft hue of silver.

All this marvelous manifestation of life is displayed in the midst of the most rapid alternations of light and shade, changing with every breath, with every undulation that ripples the surface of the sea. When daylight declines, the shadows of night spread in the deep waters, the exquisite garden which they cover is lighted up with new splendors. The medusæ and the microscopic crustaceans shine in the darkness like fairy-stars. The pennatula, which during the day is of a reddish cinnabar color, floats in a phosphorescent light; every corner of the sea-bottom sends out its ray of color; objects that look brown and dull in the universal radiation of daylight, now shine with the most charming green, yellow, and red light; and to complete the marvels of this enchanted night-scene, the large silver disc of the moon of the sea (commonly called the moonfish), moves softly through the whirling vortices of little stars. The most luxuriant vegetation of the tropics fails to develop so much wealth of form, and lags far behind the magnificent gardens of the ocean, composed almost entirely of animals, for variety and brilliance of color.

Near Amsterdam island, in the South Indian ocean, the ship encountered a belt of gigantic sea-weed, of which single plants are said to attain a length of a thousand feet and a thickness equal to that of a man's body.

They found the average depth of the Atlantic to be about two thousand fathoms, and that of the Pacific to be five hundred fathoms more. The general characteristics of the two great bodies of water proved to be the same. The bottoms of each are tolerably level expanses with slight undulations, and the tests of temperature at different depths prove conclusively, they think, that the great mass of the water found in the troughs of the Atlantic and Pacific is derived from the Southern sea. At various localities in the Pacific and Atlantic the temperature of the water precisely, or very nearly so, agreed with water at the same depth in the Southern sea, and the temperature of the bottom water in the Atlantic or the Pacific at any one locality depended apparently upon the height of the barrier which separated that particular portion of the ocean from the Southern sea from which it is derived. Thus in this way all over the Atlantic and Pacific oceans they could almost tell by the temperature of the water the height of the ridges which separated it from its source.

PEARL-FISHING IN MEXICO.

PREPARATORY to entering on pearl-fishing, a contractor must obtain a concession, and take care to be provided with such articles as the Indians most desire — eatables, tools, coarse dresses and toys. The concession is obtained by securing a fifth of the produce of the fishery to the authorities of La Paz, and then, at an expense of five dollars, a right to fish in a certain spot is acquired.

A scene is presented by the encampment of the Indian divers and their families, who are mainly supported through the year by the fishery. They impatiently await the coming of their employers, and their approach is the signal for a joyful tumult. All join in a loud shout, and many plunge into the sea, to show by their various performances their superior fitness for the labors they are anxious to undertake.

A selection is made, and the contractor takes with him those he deems the ablest hands, pursued by the reproaches and taunts of those who consider they are unfairly neglected. The conditions of the engagement secure the divers' maintenance during the fishery, and a share of the unopened oysters. These requirements granted, shaking hands seals or completes the engagement.

It is from the 15th of May to the 15th of August that the Mexican pearl-fishing is prosecuted. Then it is that calm weather and cloudless sky, which are indispensable to success, may be expected. Early in the afternoon a breeze frequently comes from the northeast. Should it rain, the work is partially suspended, and the evening is occupied in opening the oysters collected in the early part of day.

The day after the arrival of the divers, the places most likely to prove favorable are sought by experienced eyes, and a sort of rehearsal is gone through by the Indians. They plunge in to a moderate depth, and remain but a short time under water. Then they prepare themselves for the severer task. Their children, almost amphibious, remain on the bank, and thus learn to take up the calling of a diver at some future day.

The Indians dive fearlessly, being accustomed to such exercises from their infancy, plunging to a depth of from two to five fathoms. By two cords, a diving-stone and a net are connected with the boat, which always accompanies them. The diver, putting the toes of his right foot on the rope of the diving-stone, and the left on the net, seizes the two cords with one hand, and closing his nostrils with the other, goes to the bottom of the water, where he brings the net round his neck and collects and puts into it as many shells as he can reach while he remains below, which is generally about two minutes. On emerging from the sea, he discharges water from his mouth and nose, and sometimes blood, which, however, does not deter him from presently resuming his labors. Some men will frequently make fifty trips in one forenoon.

A single plunge enables a diver to secure five or six oysters, sometimes seven or eight, but rarely more. The boats which attend them are managed by rowers, or are secured by an anchor or stone fastened to a rope. Some of the divers have a rope around them, attached to the boat. The most prudent course is to be as little encumbered as possible, that they may avoid the sharks and dogfish. They are, however, generally armed with a short stick, made of hard wood and pointed. A lookout or watchman is in each boat, to give a signal to those under water when danger is apparent.

The gangs of younger divers divide into three parties, and rest for longer periods. They go to their labor fasting. When below, they of course snatch the oysters up as quickly as possible, using the short stick they carry to separate, when necessary, the oysters from any other substance. Finding an oyster likely to contain a pearl, the stick is sometimes used to open it, and the diver will reappear with a shell or two, and tell that, during three minutes immersion, he could discover nothing but shells. The fraud is often discovered, and the stick freely used on the head or back of the cheat.

NEST-MAKING FISHES.

THE usual habit of fishes is to lay their eggs in the water, and leave them to hatch without taking any trouble; but there are a few exceptions to this rule.

The fish that in tropical countries marches over the land to find a fresh pool of water when the one in which it lived has dried up, is one of the exceptions. It builds a nest for its young of the fibers of the rushes and the water plants. It is like a hollow ball.

There is another fresh-water fish called the stickleback, an engraving of which we give, which makes a kind of nest among the plants that grow in the water, and the mother-fish remains in the nest in the manner shown in the picture. It is a very bold, lively little thing, scarcely knowing fear; indeed, it is pugnacious to an absurd degree.

The most interesting fact connected with the stickleback is, that it builds nests for the protection of its young. The nest is made of delicate vegetable fibers, matted into a circular mass, cemented by mucus from the body, and is an inch or more in diameter. The male does the work of building, and then stands guard while the female is in the nest, and it fights everything that comes along, and drives away intruders with great ferocity, frequently putting in its head to see if all is right, and fanning the water with the pectoral and caudal fins, to secure free circulation and ventilation for the eggs. It is frequently seen shaking up the eggs, and carrying away impurities in its mouth. The young are hatched in two or three weeks; if any of the small fry get outside of the nest, they are instantly seized in the mouth of the parent and put back. There are about forty young to a nest.

THE STICKLEBACK.

The fish takes as good care of its young as does the hen of her chickens. It is the most combative of creatures, especially during the breeding season, when every adult stickleback challenges every other of his own sex, and they do little but fight.

FISHING IN THE SARGOSSA SEA.

LIEUTENANT MAURY says: "There is a river in the midst of the sea." Such is the Gulf-stream, with its margin in many places so distinctly marked, that you can readily discern that a ship floats half in the river and half in the sea. Ay, and there is a sea in the midst of the ocean, and in the sea a flower garden. The sea is named Sargossa, and the flower garden is of sea-weed, laid out in ever-varying form.

There is a long scientific story about how the Gulf-stream is ridged like a house-roof, and about how the drift of spars and sea-weed, etc., show this, by floating on the different slopes, but never crossing the stream; and then they tell about this Gulf-stream curving across the Atlantic, till it meets a current that sets southward along the coast of Africa, until it in turn meets another current that makes its way westward across the Atlantic, and joins yet another current setting northward, toward the Caribbean sea, which completes the marvelous circuit of currents.

Stir the water in a tub round and round violently, and throw in bits of straw and small sticks, and you see them all whirl toward the middle of the water, and finally reach the center. Thus spars, drift-wood and sea-weed getting on the inner side of this circle of currents, must naturally be kept there, and everlastingly float in the center of this gigantic belt of waters. The space enclosed by these currents covers many degrees of latitude and longitude, and is called the Sargossa sea.

Now all this may be a very unscientific way of telling what the Sargossa sea is, and is quite as indefinite as to its whereabouts. I cannot locate it very precisely, because my own belief is that it varies at times in latitude, if not in longitude. These currents — as, for instance, the Gulf-stream itself — do not all the year flow in the same tract, but are a portion of the year much farther north than at other times. Of course, the Sargossa sea must vary with its boundary belt of currents. But, substantially, this sea extends from the Cape de Verde islands to the Bermudas, and lies in what are known as the "Horse Latitudes."

Gentle reader, if you do not know what the horse latitudes are, do not sing the doxology, but be thankful that you have not experienced all that is gloomy and depressing, and patience-trying in this world. They say these came to be named "Horse Latitudes" because formerly, when men used to carry horses to the West Indies, so many of them died in this portion of the ocean. It is familiarly known at sea, too, as the Doldrums. A succession of squalls and calms (especially of the calms) makes you often seriously wonder if you will ever get away from that quarter of the globe, and to begin to inquire how many days' provision there is aboard your ship. Do you wonder, then, we went to fishing?

But the flower garden! Well, nearly all over the surface of this Sargossa sea floats a species of sea-weed. It is a coarse, vine-like thing, with a berry about the size of a huckleberry, but is of a dusky straw color. There were great unbroken patches of this that were extensive enough, and looked firm enough for a game of base ball; and then there were delicate strips in every variety of combination and form, in their varied shapes looking like a finely designed flower garden. It was a panorama of artistic gardening, and many a new and neat form might have been learned here for use in the lawns and gravel walks of a more substantial kind of park and lawn culture.

This sea-weed, nay, this mistletoe of the sea, is a sensitive and delicate thing, though it does not look it. It will not live even in a tub of salt water, unless the water be renewed some three times a day. It is a living, rootless plant, or flower (or animal?) that must be fed with some sort of nourishment which it derives from its mother, the sea.

If, however, it be hermetically sealed in sea-water, it does not die, but may be kept for years. I have some now in bottles, which is as beautiful as the day I procured it. But other portions that I put even in salt water, not made air-tight, soon turned black, withered and died.

Sometimes this sea-weed would be driven by the waves and wind into long, narrow strips; and it would always indicate a shift of the wind sooner than the dog-vane at the masthead. We found this as far north as about two thousand miles from the coast of England, which was, we are informed, very unusual.

Well, but, you say, what about the fishing? For what and how did you fish? To say nothing about sharks and grampus, etc., I answer, we fished for sea-weed. At first, we tried great bunches of huge brass hooks, but these soon broke, and left us minus "bob, line and sinker." Then we did it after a less æsthetic mode. We got the log-lines and fastened to them the iron oar-locks from the life-boats, and heaved these, harpoon fashion, into a bed of weed, and dragged it on deck. Then we searched this for shrimps and infinitesimal fishes. Of these last we found many perfect fishes, not perhaps a quarter of an inch in length, that suggested many a reflection on the minute care of Divine Providence, which could watch over such tiny creatures all alone, out in that great sea. Yet, after all, what were we but other tiny beings compared to the vast, vast ocean on whose bosom we were rocked?

And then we fished for jelly-fish — not your great plebeian blubber, or bladder, or bubble, the mushroom-shaped nettle, that annoys you when bathing at Newport or Cape May; we had better taste than that. That for which we fished was a tube-like, gelatinous creature, with a single intestine, and which, by a peculiar contraction of its body, propelled itself, lying horizontally, through the water. They were of beautiful colors, for the most part being of deep purple in the center, and shading off to pure white gelatine at the circumference. We frequently saw scores or hundreds of these joined together, and looking like a great sea-serpent as they rose and fell and propelled themselves through the water. What the object of thus being united was we could not tell, unless it was that, by simultaneous contraction, they could propel themselves more steadily and swiftly through the water, and be less driven about by the violence of the waves.

And then we fished for the nautilus — the Portuguese man-of-war, the fairy of the jelly-fish tribe, the mimic sailor, who now furls sail, and drops anchor at every angry wind, and anon sets sail, which have more exquisite tints than rainbow hues, and rides gallantly over the waves. He is a good sailor, and knows even how to right ship if blown on beam ends. Thus, good reader, we fished, not for fabulous things in a fabulous sea, but whiled away many a dull hour amid the depressing calms of the equatorial ocean, in studying some illustrated pages of God's wonder-book of the world, and ever taking our microscopes to see deeper and yet deeper into the mystery of being. I do not wish you in the Sargossa sea, good readers, but can only hope, if ever you be there, you may be as jolly and as lucky fishermen as were we who fished there several months since.

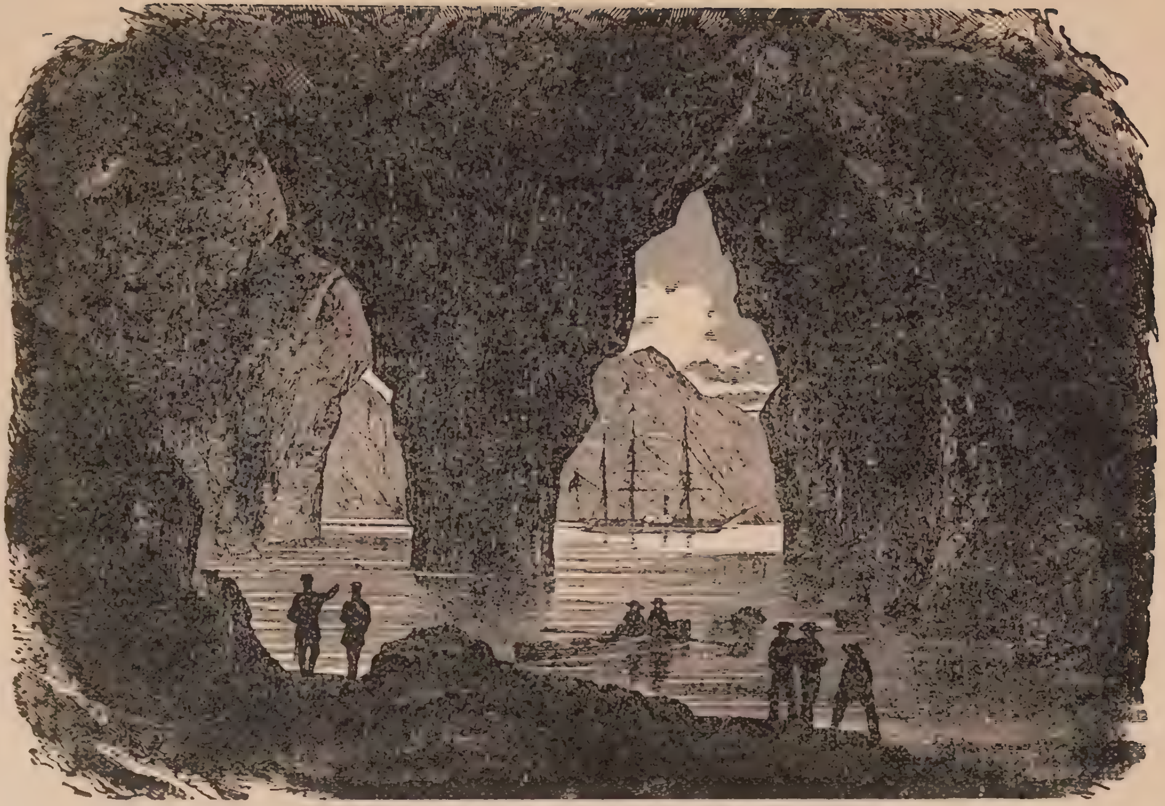
SUBTERRANEAN CAVES.

SUBTERRANEAN caverns have, in all ages of the world's history, been objects of interest, and often they have been connected with weird superstitions and occult mysteries. In this matter-of-fact age they have become subjects of scientific investigation involving problems of the first importance both in archæology and geology.

It is probable that in the early ages of the human race caves were used as places of dwelling for single families or for larger communities. The complete protection which they afforded from inclemencies of weather, the uniform temperature they gave, and the security which could there be easily obtained from attacks of wild beasts or human foes, admirably adapted them to the simple habits of primitive man; and but for the superstition which regarded these dark pathways as the avenues to the unseen world, which they located under the earth, they would have been universally used as dwelling-places. Perhaps it was this superstition which originated the habit of burying their dead in caves, so common in the early ages of our race. This habit has led to confusion, if not to false conclusions, in regard to the antiquity of the human race. Numerous caverns, in which are found the bones of extinct species of animals, occur in England and in continental Europe, and a few have been found in this country.

A careful examination of these bone caves show that, in a number of instances, human bones are found associated with the bones of the hyena, the cave bear, the great Irish elk, and other animals that became extinct at the close of the tertiary age. This has been claimed as proof that man was contemporary with those animals, and of course lived before the glacial epoch. If the remains of man and these extinct animals had been found associated together in undisturbed tertiary strata, the proof that they were contemporary would have been conclusive; but this is not the case — they are never associated elsewhere. This fact, together with the known habit of man in the early ages, of burying his dead in caves, renders the archæological argument of but little value.

Caves usually occur in limestone formations where layers of clay are seldom or never interposed between



SUBTERRANEAN CAVE, SOUTH SEA ISLANDS.

the strata. The Trenton and Hudson members of the lower silurian formation so largely developed in central Kentucky, extending south into Tennessee and with a northern projection forming the blue limestone hills between the two Miamis in Ohio, have few or no caves worthy of notice, while the heavily stratified corniferous limestone of southern Indiana abound with caves, though no very extensive ones have been found. The subcarbonous limestone furnishes the most numerous and the most extensive caves hitherto explored.

Sweden furnishes the strange phenomenon of large caves occurring in granite formations. The cave of Noridstadt, the extent of which has not yet been fully ascertained, is said to have numerous grand and beautiful chambers. I have seen no attempt to explain how these were formed in granite rocks. The lava formations of Iceland and Hawaii furnish several extensive caves formed by lava running over beds of sand which were subsequently washed out, leaving the roof of hardened lava sufficiently strong to support itself.

The existence of caves in limestone rocks is generally referred to the erosion of currents of water holding carbonic acid in solution. The well known property of water, charged with carbonic acid, to dissolve rocks formed of carbonate of lime, will account, at least, for the initial action in the formation of caves, but to complete the work in the larger caves will require the agency of a much larger flow of water than is found in them at present. A transverse fracture of the strata may occur from earthquakes or other disturbing causes. The rainwater, charged with carbonic acid in its descent through the air, fills the fissure thus made, till the hydraulic pressure forces a lateral opening between the strata through which the water escapes, carrying with it a portion of the rock in solution, converting the *soft* rainwater into *hard* limestone water.

Another portion of the rock may be carried out by the force of the current as it escapes under the pressure of the incumbent column of water. But after the channel thus formed was considerably enlarged it would demand a flow of water much greater than that furnished by any rain with which we are acquainted to carry forward the work and finish the great chambers we find in Wier's, Mammoth or Wyandott caves. It is possible, however, that at the close of the glacial age, as the great ice-field disappeared, that mighty torrents rushing from the north toward the gulf of Mexico filled all the river channels to overflowing. The forming caves would then be filled with water supercharged with carbonic acid — for the ability of water to hold carbonic acid is measured by its low temperature and high pressure. Under these circumstances the corrosive property of the glacial water would have been greatly increased.

I am convinced, however, that other agencies besides the flow of water have operated, and are now operating, to extend these wonderful subterranean excavations. The absence of light and other solar influences facilitate the formation of nitric acid from the elements of the air. Chemists have not detected the secret process by which nature converts the oxygen and nitrogen of the air into the radical of nitric acid, but we know some of the essential conditions under which the operation is performed. Exclusion of light, absolute quietude of the air, and a uniform temperature and a degree of moisture are conditions favorable to the formation of nitric acid, and these are most perfectly secured in all the large caves. In many of the caverns of Kentucky and Indiana the walls of large chambers are covered with needle-shaped crystals of nitrate of lime, which, constantly accumulating, become at length too heavy for self-support, and becoming disengaged in large masses, accumulate on the floor of the cave, frequently to the thickness of several feet. But this salt being soluble in water is slowly dissolved and carried away by the moisture of the accumulated mass, and if the walls and roof of the cave be wet the lime salt does not crystallize but is dissolved and disappears at once.

In this manner the walls and roof of the several chambers of a cave are corroded, and the cave slowly enlarging and the span of the roof becoming, at length, too great to support itself, falls with its own weight, and leaves a funnel-shaped depression on the surface, known in common language as a "sink-hole." In the cavernous regions of Kentucky and Indiana, these sink-holes are frequently so numerous, and so large and deep as to seriously interfere with the cultivation of otherwise excellent soils.

The most extensive caves which have been hitherto explored in the United States are the Mammoth cave in Edmonson county, Kentucky, Wyandott cave in Crawford county, Indiana, and Big Saltpeter cave in Marion county, Missouri. The first of these (Mammoth cave) has been so thoroughly explored and so minutely described that it will demand only a passing notice here. It is by far the largest cave now known in any part of the earth. Its length from the entrance to the termination of its longest avenue is more than ten miles, and the aggregate length of all the avenues explored is between thirty-five and forty miles. A large stream of water, supposed to be a subterranean branch of Green river, crosses the principal avenue and adds much to the interest of its scenery. Many spacious rooms, adorned with stalactites and glittering with crystals of calcareous spar, attract the wondering visitor, but these have been so often described that we will not repeat the story.

Wyandott cave, next to its Mammoth sister, is the largest cavern yet explored, and in some respects it is even more remarkable than the Kentucky cave. Its location is in Crawford county, Indiana, five miles from Leavenworth, on the Ohio river. The entrance is on a hillside sloping to the south-east, and at an elevation of about one hundred and fifty feet above low water in the Ohio river. The walls of the cave are made of coarsely crystallized limestone belonging to the sub-carboniferous formation, but the summit of the hill is capped with conglomerate sandstone, in heavy strata. As this sandstone is not acted on by chemical agents, its thick strata forms a roof for large chambers which otherwise would be filled by the breaking in of the incumbent mass, forming surface "sink-holes" so common in this formation.

The main avenue of Wyandott cave from the entrance to its termination at "Crawfish Spring" is a few yards more than seven miles by actual measurement. On this line are a number of magnificent chambers, but of these we can give attention to only one. *Grand Dome* is, perhaps, the largest subterranean room in the world. Its walls are nearly a true circle, with a diameter of three hundred feet. The roof is a regular dome, rising to the height of two hundred and sixty feet in the center. This dome is a perfect fret-work of stalactites, sometimes suspended singly, and sometimes joined together so as to give the appearance of curtains. These are usually of the clearest white, though occasionally, as if to give variety, they are stained — with iron oxide — a pale pink color. This dome, with all its beauties, can be seen from below only by a calcium light, or by the fire balls of a Roman candle thrown up to it.

In the center of this grand chamber is a rough pyramid of broken stones which have fallen from the roof. It rises to the height of nearly one hundred feet, and is crowned by three stalagmites which, viewed from below, look like statues. A beautiful spring of water breaks out in this room and directly disappears in a fissure of the rock. Beside this, Crawfish Spring, at the end of the cave, is the only water observed. All the rooms are dry.

THE GREAT PLAINS.

IN the extreme northwestern section of our country, in the vicinity of the Columbia river, there are rich fields of exploration for naturalists or geologists. We read of a plain hereabouts, three miles in diameter, strewed with pumice stones and other volcanic relics, with a lake in the center occupying, no doubt, the crater of the extinct volcano. Near this vicinity are deposits of marine shells, conclusively arguing that the mountain crests here were at some remote period beneath an ocean surf.

All this region presents scenes of grand and savage character. Rugged and romantic ravines and gorges are overhung by awful and threatening cliffs, from which the wild mountain animals peer down upon the infrequent traveler. Streams of water running here between hills of bluish earth are strongly impregnated with copperas. Vast flats or plains stretch away on this side and on that, which, during the winter season, are swept by cutting, cold winds, that seem to penetrate to the marrow of the bones.

Along the streams that feed the Platte are hills covered with cedars, with low country intervening, where the buffaloes find fine pasturage. Sometimes the traveler comes upon platforms, as it were, among the mountains, from whence extensive views of the surrounding country may be obtained; where are seen broken cliff, projecting crag, and frightful precipice with streams rushing along chasms, foaming over beetling, rocky promontories, brawling among boulders and natural obstructions, until, with gathering force and fury, by compression in some deep and narrow channel-way, they leap with foam and roar adown the mountain abutments, and flatten themselves in less turbulent tides upon the plains beyond. Again, looking from a dizzy high bluff, the spectator beholds with awe a turbid river taking its irresistible course in a succession of awful leaps from crag to crag, while the stony walls echo the thunder of its rushing voice.

The rivers in this section are sometimes bordered with alluvial bottoms, where groves of cotton-wood and willow abound, the promontories showing growths of pitch-pine. Occasionally the ash and oak grow among the cottonwood and willow. but other sections intervene, mostly barren of trees and utterly desolate in appearance. Persons living among the diversified scenery of the east can hardly picture to themselves the monotonous desolateness of the unpeopled plains of the west. Like a broad green sea its grassy billows, in the wind, roll wave on wave, with their crests, in the summer season, tinged with the golden, purple and red blossoms so prodigally sown by nature; and the inexperienced eye, sweeping over miles in area of these flats, would be ready to affirm that no human creature lurked within scope of his vision; but at twilight and later dusk, their pale columns of smoke winding spirally upward, and revealed against the far horizon only to the practiced eye of the hunter and scout, show where, in some basin or by some little stream, the wandering or warrior red man has camped to roast his apron of buffalo steak to refresh his "inner-Injin;" or, perhaps, some straggling party of scouts, and hunters, with western courage or bravado, have kindled a fire, around which they smoke and joke as carelessly as if by their own fireside, instead of amid a lurking and treacherous race of aboriginals.

If, as is reasonably argued by some scientists, the plains of the west were once the floor of a broad unknown ocean, and the scars and indentures upon many of the rocky faces of the mountains seem to indisputably argue the fact, what a wonderful wealth of history of lands, and seas, and people has dropped from the grasping, searching hand of to-day; and will to-morrow, or the generations to come, be able to find and interpret the hieroglyphics with which nature keeps her records in secret and indestructible tablets?

While the majority of human beings are apt to join in the everlasting sad refrain "Too late, too late!" we sometimes cry "Too soon — we were born too soon," longing as we do, thirsting as we are, for revelations of the Almighty Maker in His perfect works; but trusting to retain life and individuality in some

THE JUNIATA, COLORADO.

better clime, we will cry through the abyss of space — "God speed mortality in knowledge and appreciation of its Maker."

THE MOUND BUILDERS.

THE question, "Who were the Mound Builders?" has never yet been satisfactorily answered, although for the past half century the subject has been speculated upon, and scientists have exhausted themselves in their researches for a solution. All we know of the wonderful people is what may be seen of their works. No one knows when they first appeared upon this continent, their origin, how long they remained, how or when they left. That the Mound Builders were here for a great length of time is evident from the immensity of their works; that they became extinct ages ago is also evident, as the American Indians have not the slightest traditions of them, while they hold traditions as far back even as Noah's flood.

John D. Baldwin, A.M., believes they were the true American aborigines, and not emigrants from another country, while George Catlin attempts to prove to the contrary. Mr. Baldwin argues that the people of Mexico and Central America were of the same race as those of the Mississippi valley, from the fact that the works of the Mound Builders extended through Texas and across the Rio Grande, connecting with the works of Mexico. As a further evidence, he goes on with an attempt to prove that the ruins in North and Central

America are very similar; a point far fetched, for the former are entirely of earth, while the latter are, as a whole or in part, solid masonry. So far, we believe, as investigations have been made, no part of the wonderful mounds of the Mississippi valley have shown the use of hewn stone and mortar, while the ruins of the south nearly all exhibit heavy and high artistic walls of stone. Where elevations of earth were made they were adorned, at the summit, with temples of masonry work.

The identity of the races certainly cannot be made clear with such a wide discrepancy in the display of skill and intellectual ability. While the Mound Builders had a degree of civilization that elevated them far above the savages who followed, they were a long way from reaching that point of genius possessed everywhere among the prehistoric inhabitants of Central America. Had they been of the same people, there would exist striking similarity in their mechanical execution, even if there had existed a great disparity in point of general intelligence. The greatest similarity exists in the geometrical precision of the works; but this same argument might as well be used to prove that the Mound Builders and Chinese were the same.

The ruins of Central America stand as evidences of finished art in masonry and sculpture work as well; the old walls, built up strong and enduring as time, are many of them elaborately chiseled, showing designs and figures in relief equal to the best work of the present day. Among the works of the Mound Builders are found simply symmetrical mounds and circles, pottery with tasty molding, rude implements of beaten copper from Lake Superior mines, and a few imperishable articles of less consequence. What these people did in wood can never be known, for the period is so remote in which they lived, that scarcely any trace of wood can be found, even in the mounds where doubtless more or less was used.

George Catlin is of the opinion that the Mound Builders were descendants from the Welsh, who had been thrown, at an early period, upon the American coast, and that the Mandan Indians are the remnants of this once powerful race of people. Their complexion, color of hair and eyes, and singular modes of building and furnishing wigwams, leads him to believe that they are an amalgam of some foreign with an American aboriginal stock. He thinks that the ten ships under the direction of Prince Madock, from North Wales, early in the fourteenth century, landed on the coast of Florida or about the mouth of the Mississippi.

The Mandan wigwams and the cabins of the Welsh peasantry are the same. The pottery made by the two peoples are the same and strikingly similar to that found in the mounds.

The Mandans are the only Indians who manufacture beautiful sorted blue beads, and the same are found in Wales. The canoes, or boats, of the Mandans differ from those of all other American tribes, and are precisely the same as the Welsh "coracle," made of bull's hide stretched over a frame of willow rods bent and interlocked, and they are moved over the water by the paddle — in the same manner as the coracle is pulled — by reaching forward with the paddle instead of at the side. The name, Mandan, is not an Indian word but Welsh, and means red dye. Very many words in the two languages are similar.

His theory is that the Welsh came up the Mississippi to the mouth of the Ohio, and advanced up that river as far as vessels could go, then landed and planted themselves as agriculturists on the fertile banks, where they lived, flourished and increased until they became extended and powerful; at last they were besieged by hordes of savages, and for protection built themselves civilized fortifications, the remains of which are so numerous in southern Ohio.

He believes that all were destroyed but a few who had intermarried with the Indians, and their offsprings, who were half-castes, were spared. He thinks that the half-castes separated themselves both from the Indians and the Welsh, and had a village of their own, and, from the beautiful red dyes they manufactured, were called, by the Welsh, Mandans or red dyes, a name which the half-castes adopted; and after the destruction of the Mound Builders, removed themselves to northern Missouri. He gives, as an evidence of their once living south, their knowledge of the pheasant, never found in the upper regions of the Missouri.

Mr. Catlin's theory, as to the Mandans being descendants of the Welsh, is not unreasonable, but that the Mandans are remnants of the Mound Builders is not at all probable. Were they the same, or half-castes, there would be more distinct traces in traits of character than ever existed. Had the Mound Builders been directly from Wales, they would have followed the customs of their own people, and would not have become so entirely different as to have scarcely a similar corresponding trait.

Moreover, were the Mandans descendants of the mound-building people, they would retain some characteristics of their tribe — building mounds and working in metals — and still more reasonably would they have carried a distinct direct tradition back to the now great unknown people.

The Mound Builders occupied quite an extended portion of the basin of the Mississippi river and its tributaries; but their greatest works are found in southern Ohio, where, doubtless, the earth workers were most numerous and prosperous.

The traces of their existence are so peculiar to one tribe of people that they cannot consistently be linked with any other; but, where they came from, how long they remained, and in what manner they became extinct, will ever be unanswered.

The entire lack of any tradition leads us to believe that they were destroyed by some phenomenon in nature, or perhaps pestilence, and not a soul was left to tell of his people to the red man who came, it may be, centuries after.

THE OLD AMERICA.

ON that eventful morning when the darkness was dissipated which had enveloped the human mind for ages concerning the form of the earth, and a new world reared its shores from the bosom of the sea before the eyes of the astonished Spaniards, little did the discoverers think that they were gazing on a world which could compete successfully for the palm of antiquity with the one from which they had sailed. Few Americans to-day realize that on this continent we have ruined cities as majestic as Baalbec, as beautiful as Palmyra, and as mysterious as those which lie half buried in the sands of the Nile valley. Yet such is the fact.

Palenque, in Chiapas, southern Mexico, probably one of the most ancient cities in the world, presents to the explorer many architectural features which are of quite recent application in modern building. The Temple of the Cross, at Palenque, is surmounted by a roof of stone, corresponding to the most perfect mansard or French pattern. M. Waldeck, the veteran French artist, visited those ruins in 1832–3, and spent two years in their exploration; after which he returned to Paris with his fine collection of drawings, which he exhibited frequently. These drawings, in all probability, suggested to the French architects the roof which is so generally admired to-day. M. Waldeck's drawings were published by the French government in 1866 in a folio work entitled "Palenque," in which M. Viollet-Leduc, the architect of the Tuilleries, discusses with no lack of appreciation the architectural features of ancient American cities. The sculpture of Palenque and Uxmal has, in some instances, approached the Greek models in beauty. The "House of the Nuns," at Uxmal, has a façade ornamented with statues of men "cut in the round" and not simply in relief, which for beauty cannot be surpassed in the Old World. At Palenque, in one of the temples, a stucco relief, a few years ago (but since fallen), impressed its describers so sensibly with its rare beauty that they applied to it the name of the *Beau-relief*. M. Waldeck, with the critical insight of an experienced artist, declares it "worthy to be compared to the most beautiful works of the age of Augustus." This stucco represents a royal youth, helmeted with a helmet of the Roman pattern, surmounted by a crest of plumes. His wrists are encased in gauntlets. One hand points upward, while the other is extended in a horizontal position. A beautiful medallion, bearing a feminine face, is suspended from his neck by a string of pearls. A short embroidered skirt falls to his knees. The feet are shod with sandals, secured by rosettes at the ankles. This youth is seated on a high embroidered cushion, resting on a throne-like chair, ornamented with leopard heads on each side. The animal's feet are also sandaled. The grace displayed by the youth's arms and limbs, and the beauty of his features, lead us to pronounce him the American Apollo.

Leaving these forest grown temples of the south, from the roofs of which stately trees rear their trunks, we find nearer home the traces of civilization, which, if not so advanced, is equally interesting to us. In the summers of 1874–5 Messrs. Holmes and Jackson, of the United States Geological Survey corps, discovered in the valley of the San Juan river, in Colorado, Arizona and New Mexico, the ruined homes of a vanquished people. Their houses were built in little caves and upon ledges of rock in the perpendicular face of the cañon, in some instances at a height of 800 to 1,000 feet from the bottom of the cañon. In many cases these cliff dwellings were only accessible by means of niche stairways cut in the face of the rock, in which the fingers and toes could be inserted. The houses were found to be built of hewn stone, sometimes two stories high, and often to contain several little rooms. Stone balustrades frequently protected the inhabitants of these aërial homes from the dangers of being precipitated into the cañon below. Tradition tells us that a thousand years ago these cliff-dwellers cultivated the valleys of the neighboring country in peace; but one springtime a warlike people from the north came down upon them and sorely threatened them with extermination. In order to save their wives and little ones, they built these nest-like dwellings in the cliffs. Finally, when they could hold out no longer, the men went forth to meet the enemy in one final battle, in which, at terrible sacrifice of life, they held the foe at bay long enough for their families to escape to southern Arizona, where their descendants, the Moquis, reside at present.

FALLS OF THE YELLOWSTONE.

IN the next page we give a very fine view of the Upper Falls of the Yellowstone, which is one of the grandest spots on the continent. Indeed it is here that the most remarkable cañons of the world are found. Through this wonderful gorge the river boils and tumbles, falling some three thousand feet in fifty miles. The vertical sides of the chasm rise dark and gray, from which one can look down into the foaming, spray-filled depths, enlivened with rainbows and glittering like a shower of dewdrops and diamonds intermingled.

Dr. Hayden says no language can do justice to its grandeur and beauty; through the eye alone can any just idea be gained of its strange, awful, fascinating, unearthly blending of the majestic and the beautiful. Mr. Langford says the brain reels as one gazes into this profound and solemn depth, and we shrink from the

UPPER FALLS OF THE YELLOWSTONE.

dizzy verge appalled. Down, down, down, we see the river attenuated to a thread, tossing its miniature waves and dashing with puny strength against the massive walls which imprison it.

After the waters roll over the upper falls, says Dr. Hayden, they spread and flow with great rapidity over an apparently flat, rocky bottom, and at the lower falls contract again into a compact mass and plunge over a descent of three hundred and fifty feet in detached drops of foam as white as snow. Some of the large globules of water shoot down like the contents of an exploded rocket.

ANTEDILUVIAN RELICS.

THE moldering mummies found in the dark recesses of crumbling tombs and ruins of the once magnificent temples of Thebes and Babylon, speak in a silent though convincing language of a people that wrought those splendid works and carried on the marts of trade and commerce; filling the avenues and thoroughfares of those great empires with a busy throng of life and activity. Not less certain do the fossils and petrified organic remains attest of the giant animals and different orders of animated life that inhabited our planet during the ages that preceded this.

The wonders of palæontology open up a grand field of study through which we can look back into the far antediluvian world, and view the skeletons and forms of the surprising inhabitants of earth thousands, perhaps millions, of years ago. A brief description of a few of the more wonderful fossils and relics of ancient life may, perhaps, not be wholly uninteresting to the reader.

Prominent on the list is the remains of the gigantic megatherium of South America, found in the level plains adjoining the Parana and its tributaries. The bones are sometimes found scattered through the rich alluvial soil, but more frequently they are imbedded in the mud at the bottoms of rivers. At the close of an unusually dry season they are sometimes seen standing above the surface of the water like snags, or short broken trunks of trees seen in our western waters. Some forty or fifty years ago the inhabitants of one of the low alluvial districts south of the city of Buenos Ayres discovered the haunch, or pelvic bones, of one of the antediluvian monsters in the river Salado. It was entire, and had probably been washed bare at the time of high water. Its upper surface appeared considerably above the water. A lasso was thrown over it, and after considerable difficulty it was drawn from its bed and hauled on shore. This great bone measured five to six feet across, and two large men could pass through its circle at the same time with ease. It was conveyed to Buenos Ayres, where Sir Woodbine Parish obtained it, and immediately dispatched men to hunt for the remaining parts. After some time spent in sounding, dragging and damming off the water, they succeeded in securing the skull, the spinal vertebræ and tail, the shoulder-bone and hinder extremity. The thigh bone was nearly three feet in circumference, or the size of a small saw-log. The enormous claw-armed toes were over two feet in length; the upper part of the tail was two feet wide, and the cavity for the spinal marrow was a foot in diameter. This specimen was considerably larger than that previously found by Cuvier, though not in as good state of preservation. The fossil skeleton found by Cuvier was found a hundred feet below the surface, in a sand-bank, near the La Plata river, and was nearly perfect. It measured twelve feet in length and six feet in height. On account of its vast size the great French naturalist gave it the name of megatherium, from two Greek words, signifying the great monster. It was probably a species of sloth, or armadillo; and from the structure of its jaws, teeth, etc., we infer that it subsisted on roots, leaves and branches of trees. A skeleton of this gigantic antediluvian animal may now be seen in the museum of natural history at Madrid, in Spain.

An immense skull, four feet in length and three feet in breadth, with huge tusks curving downward, was unearthed at Epplesheim, in Hesse Darmstadt, in 1830. Only fragments, however, of the skeleton of this enormous creature have as yet been found; and much of its shape and form is at present only conjecture. It was named the dinotherium, and was supposed to have been from fifteen to eighteen feet in length. Dr. Buckland supposed it to be an aquatic animal, which, taking everything into consideration, is probably correct. Quite likely it was somewhat like the walrus of our northern seas, and frequented the great lakes or inland seas of the former age of the world. The shape of its teeth show that it was herbivorous.

Among the more noted antediluvian relics are the remains of the gigantic mastodon, several of which have been found in the United States, particularly in

Orange county, New York, and in the vicinity of the Big-bone Lick, in the northern part of Kentucky. A few years since the fossil skeleton of one of these ancient monsters was exhibited in London, under the name of the Missouri Leviathan. The living animal must have been considerably larger than the elephant now existing. It is now in the British Museum. In 1845 an entire skeleton of the mastodon was disinterred in a marsh, or swamp, in Coldenham, Orange county, New York. It had evidently mired or sunk in the mud while attempting to cross, and was the most perfect skeleton hitherto discovered. Within the skeleton were the contents of the stomach, consisting of coarse herbage, crushed twigs, etc. The length of this stupendous fossil elephant is stated at thirty-three feet. The length of the skull was three feet ten inches, and of the tusks ten feet. The skull and tusks together weighed 692 pounds, and the weight of the entire skeleton was 2,002 pounds. The whole was cleaned and wired in a natural and scientific manner, and eventually was taken to the museum of the Harvard University, near Boston, Massachusetts. Another specimen was dug up in the township of Montgomery, of the same county, and set up in Peale's Museum, in Philadelphia. In the early part of 1872, a gentleman by the name of Mitchell, living about a mile from Otisville, in the above-mentioned county, hired a laborer to dig muck from a swamp to place on the uplands of his farm. The man had excavated to the depth of four feet when he came upon an enormous bone, shaped like a rib. He stopped work and informed Mr. Mitchell of his discovery, who, thinking it must have belonged to some monstrous animal, directed that deeper and more extended digging be done.

At a depth of fifteen feet the pelvis, head and other large bones were found. Search was continued, and eventually almost the entire skeleton was exhumed. The main portion of the skull and upper jaw weighed nearly 500 pounds and measured over three and a half feet across the top. One of the leg bones alone weighed, when taken out, over 350 pounds. The openings where the tusks had formerly been inserted were three feet and eight inches deep. The enormous pelvis was taken out whole, and the forty pieces of the vertebræ, or backbone, were found lying near together. The channel where the spinal cord lay when the monster was alive was five inches in circumference. The back teeth extended seven inches along the jawbone, and were four inches across. The whole skeleton was said to be fourteen feet in height, and twenty-five feet in length. The contents of the stomach was found, among which was a strange grass, with blades or leaves of great length, and from one to three inches in width. There was also a number of large leaves of a singular form, and an undigested mass of coarse stalks and twigs. Some have supposed that the mastodon lived during an early age of the earth's present period of existence, but the page of history furnishes no record of this monster having been seen alive. Its remains being found in swamps or marshes, as though the animal while living had sunk or mired therein, would seem to show that that spot at least must have retained its own peculiar structure and composition amid the crash of upheaving elements, or else they do belong to the present period. Some have thought that they existed previous to the flood, and others that they formed the connecting link between the old creation and the new.

The megalosaurus was an immense lizard-like reptile, the remains of which have been found in the oölitic slate formation. No perfect skeleton has as yet been found, but from what has been discovered we can form, by comparative anatomy, a tolerably correct opinion of the shape, form and habits of this formidable reptile, which is thought to have been from forty to seventy feet in length.

The Iguanodon was a truly gigantic and fearful reptile that once inhabited the wealden formation of the southern part of England. Dr. Mantell, the celebrated geologist, who has given the world much valuable knowledge concerning the "Medals of Creation," was the first to discover the remains of this former inhabitant of earth. It is thought to have been in shape and form analogous to the Iguana, though it was of far vaster proportions. Comparative anatomy shows that the largest specimens may have been seventy feet in length, of which the tail was over fifty, and the circumference of the body was at least fourteen feet. Its teeth proclaimed it to have been herbivorous. A short, though strong horn, arose in a slightly curving direction from the snout, and altogether this monster reptile must have presented a fierce and horrid aspect. The remains discovered by Dr. Mantell are now in the British Museum.

Surely the world was not always as it is. The myriads of fossil shells, and remains of gigantic lizards and sea monsters that are found in the soil and rocks all over the landed portion of the earth, proclaim the undisputable fact that oceans and seas once covered the present land — that the briny waves once rolled in majesty, perhaps hundreds of feet above the broad savannas and rolling prairies of the present age. Imagination wanders far back through the dim and distant ages, when the huge elephantine mammoth roamed unmolested over the then sunny plains of Siberia, and the fertile tops of the Rocky Mountains formed tropical islands in the vast deep; and picture scenes amid mountain, lake and lagoon, where unsightly reptiles, seventy feet in length, wriggled, fought and sported in the water, while huge vampires, with wings twenty-five feet across, sailed in the air overhead; and the mastodon, or megatherium, crashed through the giant canes and brushwood with jarring footsteps and appalling roar, and we almost tremble at the contemplation.

CRATER OF KILAUEA.

A CORRESPONDENT writing from Hilo, Hawaii, Hawaiian Islands, gives a vivid description of the great volcano Kilauea, from which we make a brief extract: "It is apparently on level ground, the mountain rising up gradually behind it, and does not look like the volcanoes we see in pictures, on the tops of mountains, shooting up cinders and smoke, but is an immense pit, nearly circular, and over three miles in diameter, or three times the size of Vesuvius. The walls around it are all very steep, and vary from four to eleven hundred feet in height.

"We spent the morning at an immense bank of sulphur, where are obtained some fine specimens of any amount of sulphur. The bank was about twenty feet high, and perpendicular on one side, and was composed almost entirely of pure sulphur, crusted on top, but hot underneath, with a great many little blow-holes for the steam to issue from. On the perpendicular side were cracks, all emitting sulphurous vapor, intensely hot, while beautiful crystals were forming on the edges and face of the rock, dropping to pieces on being touched.

"After dinner we started to descend into the crater. Climbing down the bluff at a place near the house, we followed along the side for nearly half a mile, then making another descent down a sand-bank, came to the lava which was piled up in immense masses around the edge of the crater proper. All around the edge of the crater steam was issuing from the cracks in the lava, showing there was heat somewhere. After walking for half an hour over this sea of lava, and getting near the center of the crater, we felt a breath of hot air from our right side, and the guide going a little way in that direction, stuck his pole in some smooth looking lava and brought out some molten fire on the end of it, and we saw then it was a regular flow, the same that on a larger scale has covered miles of territory and buried cities. Being on nearly level lava its progress was so slow that it cooled on the outside as it went, forming a dark skin that kept it all the hotter inside, and its appearance was like a great worm sending out feelers here and there, filling up holes and cracks, and making mounds where its way was impeded.

"We kept carefully on the windward side, finding it intensely hot there, and sticking in our poles brought out the red hot lava, sticking coins in it as it cooled for souvenirs of the trip. It cooled rapidly, but before we were ready to leave we found our feet were getting very hot, and looking in a crack of the lava on which we were standing, we saw it red hot but three inches down, evidently but a few days old. We left and kept on our way toward the lake at the other end. Ahead of us was a big hill of lava, back of which were the lakes. We started up the hill, feeling our way carefully for fear of "blisters," and had got part way up when the guide showed us, through an opening in the side of a little mound we had just passed over, a river of molten lava rushing down the hill at a very rapid rate in a channel it melted out, forming a stream about six feet wide, spluttering and hissing like liquid iron when the crucible is tapped.

"It was a terrible sight, and before we had got over the effect of the first view, the cake of lava we were all standing together on began to 'slump' with us, as they say, cave in, and as visions of rivers of fire shot through our bewildered minds we made tracks in all directions, and each kept on his own piece after that. One said he had seen enough and wanted to go back, but finally decided to keep on, sending the guide ahead, who, finding it too 'slumpy,' came back, and we started up the hill in another place, reaching the top in safety.

"We were still five hundred feet from the lake, and found our progress barred by a fresh flow, so we had to stop, the only path being cut off where the guide had gone the day before. The lava had sunk down several feet below the surface of the lake, and we could only see through the heated air that rose over it jets of lava thrown up from the boiling mass, and hear the sound like surf on the beach, as it surged back and forth against the sides. Finding we could get no nearer view, we started down the hill, feeling with our poles as we went, not knowing what was under us, but pretty sure it was a flow, or something worse.

"Our guide broke a bubble with his pole, after letting one of us go over it, disclosing another horrible flow nearly two feet wide, which was gradually melting the crust over it, and from which nothing could have saved us had we broken through. We followed in the footsteps of the guide after that until we got into older and harder looking lava.

"After dark, not satisfied with the view we had had, I took a gallop around the side of the crater to where, from the highest part of the bluff, we could look down into the lake. The scene was one of fearful beauty; the crust which had formed over the lake in the last few hours was cracked in various places, showing the line of fire beneath, while all around the edges the lava was boiling over and lashing the banks. Soon the lake began to heave and surge, and in five or six places jets of the liquid were being thrown up in the air from the fiery mass beneath, as though they were showing what they could do if they chose. The flow in the bottom of the crater was extending rapidly, and showed much more plainly than in the day. A steam bath, using the steam from one of the many cracks in the ground, refreshed us exceedingly and helped us sleep.

"The next morning, about daybreak, we were awakened by a bright light, and going to the bank of the crater, we saw that the flow had reached our side, and finding a little jumping-off place, had formed a regular waterfall of liquid lava about thirty feet wide and twenty high, and lighting up the very skies."

THE CONQUEST OF MEXICO.

AT the time of the discovery of America a rich and powerful nation existed in Mexico, considerably advanced in agriculture, architecture, and many of the arts of civilization and enlightenment. They had cities containing hundreds of thousands of inhabitants; they built roads, and bridges, and temples, and lived under a regular system of government, faithfully administered. The people, however, were pagans, bowing down to dumb idols of wood and stone, and sacrificing to their bloody shrines hundreds of human victims.

The New World had been discovered about fifteen years, and the glowing accounts of navigators, describing the beauties of natural scenery, the balmy atmosphere, the flowery groves and bowers of splendor; and, above all, the untold wealth of gold and silver, fired the ambitious mind of Europe for adventure and enterprise.

About this time there lived in Spain a young Castilian of extraordinary ambition and energy, by the name of Hernando Cortez. The love of adventure seemed to thrill through every fiber of his being; and, bidding his friends adieu, he set sail for America and landed in Cuba, at the age of twenty-one. Obtaining from the governor a beautiful plantation, to be worked by slaves, he lived in idleness for several years, occasionally engaging in disputes and quarrels, in one of which he was arrested and thrown into prison.

For some time his life was somewhat stormy, but at length he married a lady of some rank, and succeeded in gaining the good will of the governor. The entire population of the island was now thrown into the wildest state of excitement by the news of the discovery of a mighty empire in the west, just over the waves of the Mexican gulf. It must be visited; it must be conquered; it must be taken in the name of the king of Spain. An expedition was fitted out and Cortez was given the command. It was the proudest moment of his life. He was eager, energetic and enthusiastic.

Cortez was now thirty-three years of age. With such earnestness and indefatigable energy did he proceed with his preparations, that the governor, fearing him as a rival, sent an order to deprive him of command. But it was too late to intercept him, and he sailed away, to land in due time on the distant shores of Yucatan. He had seized two ships before leaving the Cuban coast, and his fleet was now composed of eleven sailing vessels, the largest of which would scarcely carry a hundred tons. His entire force consisted of five hundred and fifty-three soldiers, a hundred and ten sailors and two hundred Indians. They were mostly armed with cross-bows, lances and battle-axes, though they had quite a number of muskets, and fourteen small cannon. They also had sixteen horses — the first that ever trod the soil of the American continent — and were well supplied with ammunition.

The natives were assembled and informed, through an interpreter, that Cortez had come to establish God's holy Catholic religion in the New World. They were at once commanded to turn from their dumb idols of wood and stone, and range themselves under the banner of the cross. This they refused to do. Paganism though it was, they clung to their system of religion with a tenacity and a faith worthy of christians. In the fullness of their ignorance they fondly believed their idols would save them from the wrath of the invader. If they were to turn aside and incur their displeasure, they really believed the earth would rend and quake, bringing upon them overwhelming ruin and destruction.

Expostulations being in vain, Cortez turned his artillery upon them, and ordered the cavalry to charge up to the doors of the temple. The place was quickly cleared and the idols hewn down and demolished. The natives looked on in fear and consternation. Resistance appeared to them hopeless, and they submitted to the will of the cruel Spaniard.

On the 4th of March, 1519, they again set sail for the westward, and at the end of nine days they anchored at the mouth of the river Tobasco. They had reached the mainland of Mexico, and active operations were about to be commenced. Invoking the blessing of God, they embarked in boats and proceeded up the river. Most of the way the stream was lined with majestic forest trees, thick underbrush and trailing vines, with clusters and festoons of sweet-scented flowers. The soldiers were highly elated, and they laughed and chatted, and sang songs in joyous transport as they proceeded around the graceful curves and bends amid the splendid scenery. To their excited imagination it seemed to be a region of beauty bordering on some fairy land.

Hundreds of natives were seen following along the bank and flitting among the trees, watching their movements with a jealous eye, and evincing by their jestures and actions a spirit of resistance. Reaching an opening in the forest, where a beautiful meadow sloped back from the stream, Cortez decided to postpone farther advance for the day. Rowing his boats to an island in the center of the river, he established his quarters for the night, intending to make a landing in the morning. Daylight revealed the river swarming with war canoes, and a host of Indians drawn up in battle array on the shore.

A terrible battle ensued, and an immense number of the natives were slain. Superior skill triumphed, and Cortez marched into the city of Tobasco, amid showers of stones, clubs and arrows, that fell harmlessly upon the iron armor of the invading Spaniards. Marching to a great tree that grew in the center of a noble square, Cortez cut three gashes across the bark, and raising the gilded banner above his head, took possession of the city in the name of the "Royal Sovereign of Spain."

The whole country was now fully aroused. Immense numbers flocked together to repel the foul invader. Who shall say that their cause was not just? Cortez sent for his cannon, horses, and every available man, and on their arrival raised a gorgeous black velvet banner, embroidered with gold, and adorned with a richly wrought cross, and marched haughtily forth to massacre the army of brave defenders. On a level plain, a few miles from the city, the two forces met. The natives outnumbered the Spaniards more than fifty to one. The contest was terrible, and the slaughter of the Mexicans merciless and awful. They thought the horse and rider of their opponents one and the same animal, and the voice of the artillery they imagined to be thunder from heaven, and they were paralyzed with mortal fear. They fled in terror, and Cortez pursued, exulting in the horrid carnage. The Mexican army was almost annihilated, and the feeble remnant hastened to purchase peace at any price. The cruel invader told them he would *forgive them* if they would send in their entire submission. "But," said he, "if you refuse you may prepare for the worst. Remember, with my force and power I can ride over the land and put every living thing in it, man, woman and child, to the sword."

The spirit of resistance was broken, and trembling with fear they appealed to the conqueror for clemency and mercy. Dashing their idols to fragments and rearing the cross of the Roman Catholic faith, he departed for the seat of the great empire in the interior. Descending the river to his ships he re-embarked, and sailed away to the westward. After a voyage of several hundred miles, during which the villages and luxuriant plantations of the Mexicans were often visible from the decks, he landed at San Juan de Ulua.

A camp was immediately formed, and hundreds of unoffending natives thronged the vicinity to witness the grand display of the soldiers of the white race beyond the seas. A fleet native courier had been sent to the seat of the great empire, and in a few days an embassy arrived from the Mexican capital, magnificently attired, and bearing presents of value to the Spaniards. Among these were ornaments of feathers and beadwork, interspersed with jewels, and richly wrought articles of silver and gold. There were also two grand circular plates, of the size of carriage wheels, one of silver, representing the moon, and the other of pure gold, worth over $200,000, representing the sun. These princely gifts were accompanied with the good wishes of the ruling emperor, Montezuma, and with the kind request that he would depart in peace, carrying his best respects to his brother, the king of Spain.

Cortez received the proffered gifts, but declared he could not forbear a visit to the Mexican emperor. The ambassadors returned, after vainly trying to persuade him that his proposal would be in vain; and in ten days they again appeared, bearing truly imperial gifts, and assuring him that their emperor could not suffer their further approach upon his capital. The magnificent presents they had received inspired the lustful hearts of the Spaniards with a determination to conquer the golden territory, and after quelling a discord among themselves, they pushed on to Zempoalla, a city of some thirty thousand inhabitants. Destroying their idols, and installing in their place an image of the Holy Virgin, they forced the people to bow before the sovereign religion of Rome. The cry was now raised, "Onward to Mexico." It was early in August, 1519; the route of their march lay through a beautiful country, abounding in flowery splendor and tropical luxuriance. Passing Naulinco, they entered the defiles of the mountains; and after three days passed in toilsome ascent, they came out upon the flowery table-land and broad rolling savannas of the Cordilleras, seven thousand feet above the level of the sea.

Before them, as far as the eye could reach, were groves, hedges, cultivated fields, roads, villages and cities. The land seemed to be overflowing with plenty. An industrious and peaceable population thronged the thoroughfares, and labored in the fields. They soon reached the large city of Tlatlanquitepec, where they found a hundred thousand skulls piled in regular order, where human beings had been offered in sacrifice to the idols or carved gods of the natives. After vainly trying to establish his religion here, Cortez marched on from one village to another, plundering and robbing as he saw fit, until he reached the rich and powerful country of the Tlascalans.

This nation was the rival of the empire of Montezuma, and for many years it had successfully resisted that powerful monarch. A hostile force soon appeared, and a fearful battle ensued. The timely arrival of the artillery saved the Spaniards from destruction. Continuing their march, they wound along a delightful valley, and as they were emerging into a broad savanna they beheld the Tlascalan warriors, in overwhelming numbers, drawn up in battle array before them. The waving plumes and banners, and glittering helmets of the countless host, for the moment filled the hearts of the Spaniards with alarm; but they had reached that point where there was no turning back. The onset was terrible, and the slaughter on the side of the natives indiscriminate and awful. All day long ball and grape-shot plowed their close ranks, mowing them down without mercy; and as the sun sank to rest they retreated, leaving the ground covered with dead and dying. Cortez sent an embassy, asking for an armistice, and permission to visit their capital. The answer was sharp and defiant. "The Spaniards," said they, "may pass on as soon as they choose to Tlascala. When they reach it their flesh will be hewn from their bones for sacrifice to the gods. If they prefer to remain where they are, we shall visit them to-morrow."

The morning of the 5th of September dawned, and the Spanish army slowly commenced its march. Their whole number, including the natives that had joined them, was scarce three thousand men. To them it was a gloomy hour. They had marched a little over a mile when they came upon the enemy, a hundred thousand strong, extending over a wide plain six miles square. With wild yells and hideous clangor the awful carnage commenced. Like ocean's resistless wave, the Tlascalans rushed forward, fairly darkening the sky with showers of arrows and javelins. The Spanish artillery belched forth its load of death-dealing hail and missiles of destruction, and whole platoons fell bleeding to the ground. Hour after hour the awful conflict raged. The ground was drenched with blood, and covered with mutilated, bleeding, dying humanity. Every horse, and nearly every man in the Spanish army was bleeding, and many had fallen. At length, when the Spaniards had fought to the utmost point of their endurance, the tide of battle turned. The Tlascalans broke and fled, and the invaders, rending the air with their exultant shouts of victory, dashed after them like infuriated demons, cutting them down until they grew weary at the hideous work of merciless slaughter.

A treaty was made, and the idols in the great city of Tlascala overthrown. With terrible threats, Cortez awed the people into complete submission, and forced them to bow to his religion. In about three weeks he again set forth. A hundred thousand natives offered him their services. Taking six thousand, they marched away, and after several days arrived at the city of Cholula. It was handsomely laid out in streets and squares, and contained a hundred thousand inhabitants. The Spaniards were amazed at the aspect of luxury and refinement which met them on every side. Assembling an immense multitude in a beautiful square, Cortez pretended for a moment to address them. All the Cholulan officers of rank were there, and a vast throng of innocent and unoffending women and children. Around them stood the blood-thirsty Spaniards. At a preconcerted signal, every musket and every cannon were suddenly discharged into the unsuspecting host, and the mailed cavaliers, with blood-curdling yells, rushed upon them with dripping knife and saber. Neither age, sex nor condition was spared. The unarmed and defenseless inhabitants cried for mercy, and in wild confusion ran hither and thither, seeking to escape; but a perfect hail-storm of iron, and lead, and steel, met them on every side, and they fell like reeds before the whirlwind. The Tlascalan allies joined in the fiendish work, and dashing through the streets, with triumphant war-whoops, butchered every one they could find. The city was fired, and the flames lapped up the unsightly pools of blood, and blackened the ghastly heaps of mutilated carcasses.

Cortez immediately erected a cross and an image of the Virgin, and offered public thanksgivings to God for the victory; declaring his only intention was to convert all unbelieving pagans, and turn their hearts from heathen idolatry to the true christian religion of Jesus! Cortez was a fanatic; a blind religious enthusiast. Perhaps, in the fullness of his ignorance, he believed he was working for the cause of Christ. Had he read His word, however, he would have learned differently, and might have looked upon his infamous work as the world looks back upon it to-day.

Proceeding onward, after many days' weary march, they looked down from a gentle eminence upon the glittering palaces and gilded temples of Mexico. City after city, alarmed for their safety, came forward in fear and trembling to offer their submission and allegiance. With glistening armor and waving banners they marched proudly forward over the intervening plain, and across the causeway into the island city. The scene was almost enchanting. Parks and groves and flowery gardens were laid out in beautiful designs; and the streets, palaces and pagodas rivaled in architectural splendor the nobler examples of the Old World. Montezuma sent an embassy, offering many loads of gold if the invaders would desist from their work, but Cortez was inexorable, and moving on he took up his quarters in a row of strong stone buildings. Montezuma soon made his appearance, seated in a magnificent palanquin, clothed in more than Oriental splendor. A conference was held, but no terms were agreed upon.

One day the emperor led the Spanish chieftain into the temple, into the apartment of the great Mexican god. The gilded walls and floor were bespattered with blood, and three human hearts, yet warm and almost palpitating, lay upon the sacrificial altar. Near by were the priests, with their bloody knives, and bare arms besmeared with gore. The sight was too revolting for even the cruel heart of Cortez, and his inner instincts of humanity arose in his bosom. Montezuma was seized as a prisoner and bound in chains. Disturbances arose between the soldiers and natives, and hundreds of the Mexicans were massacred.

The whole population of the city, over five hundred thousand in number, were in a fever of excitement. At length the disturbance ripened into a general outbreak. The army of Cortez was assailed by countless thousands, and the most bloody conflict occurred that the soil of America had ever witnessed. The city was on fire, the smoke was suffocating, and the din of battle, rising from a hundred thousand combatants, convulsed the air with unearthly clangor. Closer and closer they drew about the besieged Spaniards, and at last Cortez approached his royal prisoner and asked him to interpose.

Montezuma, attired in his regal robes, ascended the rampart, in the full presence of his subjects, and instantly the tumult was hushed in silence. But with the first word advocating a cessation of hostilities, the air was darkened by arrows, clubs and stones, and he fell mortally wounded. The desperate struggle was renewed with more energy than before; the Mexicans declaring that they would crush the invaders, even if they had to destroy a thousand of their own men for a single one of the enemy. At length Cortez was obliged to retreat. We will not worry the reader with a description of the awful battle along the causeway, and over the broken chasms, that had to be bridged by human bodies and the broken débris of war. It was hand to hand, sickening and terrible. Onward they cut their way, through the living mass of opposing humanity, for miles. Their cannon were gone, their clothes torn and tattered, and their bodies wounded and bleeding. War-worn, blood-stained and weary, they at length reached the land of the Tlascalans, and were safe.

Months passed away. At length, receiving reënforcements, and a fresh supply of ammunition, artillery and horses, Cortez again ordered the march upon Mexico. Battle succeeded battle; and for weary days they pressed their way forward, inch by inch, until they again threaded the narrow causeway, and entered the Mexican capital. A last mighty struggle ensued, more terrible and sanguinary than any that had preceded it. The city was reduced to a mass of ruins; and the streets and broken causeways ran red with blood. Guatemozin, who was now emperor in place of Montezuma, was taken prisoner while endeavoring to escape in a boat, and brought into the presence of Cortez. "I have fought," said he, "as became a king. I have defended my people to the last. Nothing remains but to die. Plunge this dagger into my bosom, and end a life which is henceforth useless."

Upon the capture of Guatemozin the carnage ceased. It was the 16th of August, 1521. Mexico, the proud Aztec city, had fallen, and the empire of Montezuma had passed away.

* * *

PATAGONIA AND THE PATAGONIANS.

THE Patagonians are a race of savages of large stature, with high cheek-bones, black eyes, expressive of savage cunning, and straight, thick, long, coarse black hair. They have no canoes, and hate the water; but they are fond of rum and whisky. Their social life is of the Mormon characteristics. The Patagonian wives are merely slaves. Their cookery is not elaborate; they merely heat huge slabs of flesh, and devour this nearly raw food with the ferocity of tigers. Their temper is evil and fierce in the extreme. They have all the savages' instinctive love of ornaments. Their religion is as rude as their lives. They believe in a good spirit and an evil spirit. In the spring they hold festivals of worship in honor of the good spirit. This occasion is made a time of elaborate display of all the finery which they possess. The women chant monotonously, beating time on rude tambourines. They dance facing the east, with their lances arranged symmetrically in front of the place. Many of the men blow on rude reed fifes as they dance, making spasmodic and diabolical strains.

At a signal from the chief, the programme changes; the men leap upon their horses, form a cavalcade, and proceed to display their feats of horsemanship. These performances, with brief intermissions, are kept up for days.

Patagonia is eight hundred and forty miles long and two hundred miles wide. It is situated in South America, ending on the northern shore of the straits of Magellan. It is a desert region. Hardly a tree is seen; no alluvial valleys are there, only coarse herbage and thorny brushwood are to be seen. The few rivers that traverse it run over pebbly beds, and the soil is everywhere sand and gravel. It is chiefly interesting to the savage inhabitants, and to scientific students for the formation of its plants, which are unlike those of any other region of the world.

The country is a succession of terraced plains, the lowest (near the Atlantic), being ninety feet, and the highest, nine hundred and fifty feet above the level of the sea. These plains have no charm of climate to offset the sterility of the soil; winds howl, and sleet drifts over them the greater part of the year; but there are alluvial belts, near the rivers, which might become fruitful under cultivation. But the roving Patagonians depend upon the chase for subsistence. Their horses are small and wiry, with shaggy hides, and their masters often remain all day in the saddle when the chase is at its height.

The Patagonian weapon is the spear. They have no firearms, neither bows and arrows, but each savage is armed with a long knife, which he has purchased from traders in the neighboring countries.

When a troop of these wild horsemen are seen scouring across the plains in pursuit of game, with their long hair streaming in the wind, their wicked visages and colossal breasts smeared with grease and soot, they look like a squadron of gigantic furies arisen from Plutonian regions, and might strike a thrill of terror through the bravest heart.

AN OPIUM DEN.

A FIRST-CLASS opium den is fitted with a table about eight feet long and five feet wide, and about two and one-half feet high. This is covered with matting, and fine mats are placed on this. In the center of the table is a tray containing opium, opium pipes, and a peculiarly shaped lamp, which has a small flame. The opium pipe is made of a piece of mahogany or ebony wood. The stem is an inch in diameter, and about two feet in length. A hole about half an inch in diameter runs the whole length of the stem. About six inches from the end of the stem is the bowl of the pipe. It is made of a peculiar kind of sand and clay in China, and is very hard and fire-proof. The bowl is about two inches in diameter. The top of the bowl is entirely closed, except a small hole in the center, about the size of a large darning-needle. In the bottom is a hole about half an inch in diameter, into which is inserted a brass coupling, connecting the stem of the pipe. The opium is kept in a small box made of horn. Every Chinaman carries one.

When a person desires to smoke opium, he reclines upon the table, upon one side. With a piece of steel, about the length and size of a large knitting needle and sharp-pointed, a little of the opium is taken from the box. It is held over the blaze of the lamp until it is thoroughly cooked. The piece of steel is kept in motion all the time, and the opium when cooked is formed into the shape of a small pistol cartridge. The point of the steel needle is then inserted into the small hole in the center of the bowl of the pipe, and gently drawn through the cartridge of opium. The smoker then turns the bowl of the pipe to the flame of the lamp, reposes upon a wooden pillow, and smokes. He gently draws in his breath in long and rapid respiration. He must be careful, however, to slightly remove his lips from the stem of the pipe when taking breath. If he should breathe slightly into the stem it stops the flow of the smoke of the opium. When the flow is stopped the sharp-pointed steel is used to open the small hole in the bowl of the pipe. It takes about three minutes to prepare the opium for the pipe, and about one to smoke it out, ten or twelve whiffs only being required. From six to twelve pipefuls are generally smoked before the smoker is satisfied.

A little over a year ago a great many white people of both sexes patronized the opium dens. The board of supervisors of San Francisco deemed it best to put a check upon the growing evil, and a stringent law was passed, making it a penalty of not less than $50 nor more than $500 for the keeper of any opium den to allow a white person to smoke in the place. It was also made a criminal act for any white person to be found in an opium den, the fine being fixed at not less than $50. Since the passage of this law the dens drive a less lucrative business. Their customers are all Chinese, two generally occupying one table and using one lamp.

The Chinese resort to opium smoking for any slight ailment, and it is regarded by many of them as a panacea for all their ills.

IGNIS FATUUS.

THIS phenomenon is often met with in all countries, and is one that has remained longer a mystery among the people in which it occurs, than any of its kind, and in these countries like all such appearances, accompanied by strange stories of disastrous consequences, have been attributed to Satanic agency, and from its supposed effects it has been named "Ignis fatuus," "Will with the wisp," and "Jack with the lantern," etc. Its appearance, and wild and vague history, and sad traditions, have done much to bewilder and mislead the vulgar mind; giving rise to many of the most extravagant and sad tales that a heated imagination can possibly devise.

This meteor, or light, is generally seen in dark, damp nights of summer — never in winter — over wet, marshy or peaty grounds, in which it is generated, and occasionally over damp or wettish burying-grounds, giving rise in the latter case to strange and frightful stories of ghosts and hobgoblins.

Perhaps in all morasses, if deep enough, the bodies of animals are deposited from being mired there, these undergoing decomposition while the vegetable substances of the swamp are also decomposed, the bones of these animals being chiefly phosphorus and lime, which, with the potash of the plants, react on each other, and then aided by the summer's heat give rise to the production of phosphureted hydrogen — "Will o' the Wisp."

This compound gas coming in contact with the

IGNIS FATUUS — "JACK-O'-LANTERN."

atmosphere combines with the oxygen forming water and phosphoric acid with the liberation of a little of the phosphorus vapor. When these unions take place they burst into a flash of flame of the most vivid and intense light, which flash but for a moment. This is the "Ignis fatuus," the fatal or deceptive fire.

It is maintained by reputed witnesses that this light travels and allures the benighted traveler to follow it by decoying him into some fatal, swampy spot, where it leaves him to his death fate; hence it is also named "Jack with the lantern." The fact that these chemical phenomena which I have described may be going on in different spots nearly at the same time, may, to the credulously timid and excited mind, be easily imagined to have a progressive movement in a dark night, but in reality no such movement takes place.

THE MONKEY RACE.

THOSE who have never studied minutely the natural history of the tropical lands, will be surprised when they learn of the multitudes of monkeys that inhabit their forests; and this surprise will be increased when they learn of the great variety of species of this singular animal. It would seem as though an effort had been made to multiply them above all other races of animals, and to diversify them to the greatest extent with respect to size, form, color and disposition.

All this is seen in the monkey tribes of the Old World, in equatorial Africa, and in the Indies, but these, as a race, differ greatly from those found in the tropical forests of our own continent.

It would seem as though some are formed to burlesque human nature, or to see how near a human being an animal can be made, and yet not touch its essential points, the form, the expression, the voice, sympathy, all playing closely around that circle that is sacred to human nature. Others are formed, it would seem, to put to shame the acrobat in his highest development. I once visited a temple grove in the East Indies in which was an orang-outang, or something of the kind, which was kept by the priests as a sacred animal. It was of cinnamon color, about four feet in height, with a face strikingly human, and a look of great intelligence. Its arms were long and muscular, its legs short and light. When I first saw it, it was sitting on the limb of a tree, some twelve feet from the ground, eating fruit. I inquired of a priest, and he told me that he was "very good and very bad," that he was "very slow and very fast." He said: "When he gets mad we all have to *ning-pi* [run], but when he is good, he is kind as a mother. He is for a long time lazy. He eats and sleeps, and that is all, but pretty soon, all at once, he will, just for play, go among the trees like a rocket."

I sat and watched him till he had finished his meal, when he went up high among the branches and began his play, as if to show me what he could do. He used only his arms, but with these he would propel himself with wonderful rapidity from branch to branch, and from tree to tree. Occasionally he would fall, by gradual descent, to one of the lower limbs, which seizing by one of its hands, with a swing would throw itself apparently twenty feet among the high branches of an adjoining tree. From this it would make a prodigious leap to some other point at a greater distance, and it went with such surprising speed that it was with difficulty I could keep it in view. This exercise was kept up for some twenty minutes or half an hour, when it returned to its starting point for rest and sleep. I never was more surprised at an exhibition of agility, and I thought how tame are all human efforts compared with his.

Among the monkey tribes are found almost every degree of intelligence, from the chimpanzee to the stupid species found in Brazil. It is said that some of them construct baskets with which to catch fish, and build huts in which to live and keep their stores, and arm themselves with clubs and stones, with which they defend themselves when attacked.

In the Indies it has often been noticed that a species of small brown monkey, after trying ineffectually to break a cocoanut, will carry it high up in a tree and let it fall, and repeat the experiment if necessary many times, or until it breaks. This seems to show calculation, but we call it instinct. We generally, I think, associate the monkey family with cunning and sprightliness, but there are some kinds almost as sluggish as the sloth, that seem only to want to eat and sleep. No race of animals shows a greater diversity in appearance than the monkey. Some are nearly as large as a man, and others no larger than a rat. Some are neatly clothed with hair, and others are almost bare. Some are of a single color, and others variegated in most curious ways. I have seen them among the trees with faces of black and white, and blue, and the look was most comical, as they showed their teeth and chattered, with stretched necks, and eyes fastened on me.

The monkey is probably, on the whole, the queerest of all the animal creation, the sport of boys and the study of men. It approaches nearly to man, but cannot quite touch him. It tries to imitate him, but soon reaches bounds that it cannot pass.

I once, when hunting, mistook in the jungles a monkey for another animal, and brought him down from a tree top. When I came to bag my game, I found a wounded monkey sitting and looking at me most imploringly. I involuntarily looked around to see if any one had witnessed the sad deed, and at the moment my conscience seemed to reproach me with fearful guilt. I imagined I could see a good deal of human nature in the stricken animal before me.

I once read from a book that a sea-voyager once went on shore in a monkey land with a bundle of sailors' caps which he hoped to sell to the natives. Being weary, he laid down to take a nap. When he awoke, what was his surprise to find his caps gone, and on looking up, saw them on the heads of monkeys, that were chattering in high glee among the trees. In his anger at his loss, and at the provoking merriment of the thieves, he took the cap he had on his head and threw it to the ground in disgust, saying: "As you rascals have all the rest, you may take this, too." He had no sooner done this than all the monkeys did the same, and he was permitted to pick up his property and go on his way rejoicing.

I once had a little ring-tailed monkey as a pet. It cut up all the antics possible to one of its species, but it was so thievish that I was obliged to send it back to the woods among its wild neighbors.

Mr. Pollard states that in his drinking days he was the companion of a man in Arundel county, Maryland, who had a monkey which he valued at a thousand dollars. "We always took him out on our chestnut parties. He shook off all our chestnuts for us, and when he could not shake them off, he would go to the very end of the limb and knock them off with his fist. One day we stopped at a tavern and drank freely. About half a glass of whisky was left, and Jack took the glass and drank it all up. Soon he was merry, skipped, hopped and danced, and set us all in a roar of laughter. Jack was drunk.

"We all agreed, six of us, that we would come to the tavern next day and get Jack drunk again, and have sport all day. I called at my friend's house next morning and we went out for Jack. Instead of being as usual on his box, he was not to be seen. We looked inside, and he was crouched up in a heap. 'Come out here,' said his master. Jack came out on three legs; his fore-paw was upon his head. Jack had the headache; I knew what was the matter with him. He felt just as I felt many a morning. Jack was sick and couldn't go. So we waited three days. We then went, and while drinking, a glass was provided for Jack. But where was he? Skulking behind the chairs. 'Come here, Jack, and drink,' said his master, holding out the glass to him. Jack retreated, and as the door was opened, slipped out, and in a moment was on top of the house. His master went out to call him down, but he would not come. He got a cow-skin and shook it at him. Jack sat on the ridge-pole and refused to obey. His master got a gun and pointed it at him. A monkey is much afraid of a gun. Jack slipped over the back side of the house. His master then got two guns, and had one pointed at each side of the house, when the monkey, seeing his predicament, at once whipped upon the chimney, and got down in one of the flues, holding on by his fore-paws. The master was beaten. The man kept that monkey twelve years, but could never persuade him to taste another drop of whisky. The beast had more sense than a man, who has an immortal soul, and thinks himself the first and best of God's creatures on earth."

I once witnessed a monkey dinner party. It was the funniest dinner party that could be imagined. Five highly respectable monkeys sat at a table with plates and wine-glasses, and the sprightliest, most attentive of monkeys waited upon them, tray in hand, like a good, highly genteel waitress, as she was.

The monkey at the head of the table was dressed as a naval officer, with admiral's hat, epaulets, side whiskers, all complete. He was elegant in his manner when not licking his plate, and he had an injured, reproachful way of turning on his seat and looking at the waitress, when she failed to bring what he wanted, that was wonderful to see. At the foot of the feast sat a farmer monkey, in funny felt hat, white smock and loose trousers. He had a tremendous appetite, and soon finished his meal and began knocking hard upon the table for more. The admiral, who was very proud, never once noticed him, which the hungry farmer accepted in good part, as he didn't take any great interest in admirals.

But the side of the table was the liveliest, after all. In the middle sat a fine monkey lady, whom I afterward learned was called " Mrs. Lorne," and the monkey gallants on each side took turns in conversing with her. Sometimes, indeed, they both addressed her at once, and then the fashionable Mrs. Lorne would utter a feeble screech and give them a piece of her mind, to the great terror of the farmer and the amazement of the admiral. She was a lovely creature in their eyes, you may be sure, for she wore a red velvet dress and a white hat with bright pink feather, and her coquettish way of tossing her head was quite irresistible. Wine was freely taken by all the guests, but I learned later that it was only raspberry juice and water. It was funny enough to see them take up their glasses in one hand, bow to each other, toss off the contents, and then pound the table for a fresh supply.

I could not see what they had to eat, but it was something good, for they smacked their lips over it and grabbed bits from each other's plates so that their master frequently was obliged to expostulate with them.

Ah, the master! I forgot to speak of him. He was their servant just then, and stood at a respectful distance behind the table, bottle in hand, ready to fill their glasses whenever called, or gently to remind the guests that to lick one's plate is not looked upon as good table manners. Meantime the pretty waitress skipped about, bringing this thing and that as the master ordered, often sinking into a little chair near by for rest and solemn meditation. The dear thing was easily "flustered," and the manners of the admiral sometimes so confused her that she seemed almost ready to faint. At one time, when the master put a pair of lighted candles in her hands, bidding her hold them very carefully, she sprang up, ran from the stage with them, holding them both upside down, still blazing and spattering. Now and then the temptation to get a bit from the table grew so strong that she would watch her chance to take a sly grab when the guests were chattering together. Whenever she succeeded in this hundreds of spectators would applaud heartily. The children thought it rather improper for grown persons to encourage theft in that way, but we couldn't help feeling sympathy for the pretty waitress, notwithstanding good morals.

Monkeys are very vivacious and amusing, but they are often bad; tearing up clothing, breaking bottles and cutting various capers is a monkey's delight. They will stand and mimic as long as they have anything to mimic; they are also inveterate imitators. A lady had one, whom she found dressed up in her clothes and admiring himself before the glass; he also had her ribbons and things scattered over the floor in a very confused manner; that is, in a manner peculiar to a vivacious little monkey. They also are very sensible; we will give the case of some ring-tailed monkeys bridging a stream. Sooner than go into water a monkey will put his head into the fire. When they cannot leap a stream they will bridge it. My readers will perhaps wonder how a monkey can bridge a stream, but they will soon see. An eye-witness of the following, says: One, an aid-de-camp, or chief pioneer, perhaps, ran out upon a projecting rock; and after looking across the stream, as if calculating the distance, scampered back and appeared to communicate with the leader. This produced a movement in the troop. Commands were issued and fatigue parties were detailed and marched to the front. Meanwhile several, engineers no doubt, ran along the bank, examining the trees on both sides of the *arroyo*. At length they all collected around a tall cottonwood that grew over a narrow part of the stream, and twenty or thirty of them scampered up its trunk. On reaching a high point, the foremost ran out upon a limb, and taking several turns of his tail around it, he slipped down and hung his head downward. The next on the limb, also a stout one, climbed down the body of the first, and whipping his tail tightly around the neck and forearm of the latter, dropped off in his turn, and hung head down. The third repeated the manœuver upon the second, and the fourth upon the third, and so on until the last upon the string rested his forepaws on the ground. The living chain now commenced swinging backward and forward, like the pendulum of a clock. The motion was slight at first, but gradually increased, the lowermost monkey striking his hands violently on the earth as he passed the tangent of the oscillating curve. Several others upon the limbs above aided the movement. This continued until the monkey at the end of the chain was thrown among the branches of a tree on the opposite bank; here, after two or three vibrations, he clutched a limb and held fast. This movement was adroitly executed just at the culminating point of the oscillation, in order to save the intermediate links from the violence of a too sudden jerk! The chain was now fast at both ends, forming a complete suspension bridge, over which the whole troop to the number of four or five hundred passed with the rapidity of thought. It was a very comical sight to witness the quizzical expression of countenances along that living chain! The troop was now on the other side, but how were the animals forming the bridge to get themselves over? Manifestly, by number one letting go his tail. But then the *point d'appui* on the other side was much lower down, and number one, with half a dozen of his neighbors, would be dashed against the opposite bank or soused into the water. Here was a problem, but it was soon solved. A monkey attached his tail to the lowest on the bridge, another girded himself in a similar manner, and another, and so on till a dozen more were added to the string! These last were all powerful fellows; and running up to a high limb, they lifted the bridge to a position almost horizontal. Then a scream from the last warned the tail-end that all was ready, and the next moment the whole chain was swung over and landed safely on the opposite bank. The whole troop then scampered off and disappeared.

There are very many species of monkey, some so much like man that were it not for his coating of hair the casual observer could hardly distinguish the monkey from a man. Nearly every species is found in South America and the West Indies; in South America there are preaching monkeys, weeping monkeys and howling monkeys, and many other kinds too numerous by far to be mentioned here. There are many kinds also in the East Indies and Africa; neither is India wanting in monkeys. I will give an ancedote of some monkeys in India. A gentleman who was spending a short time with a friend in India, had been out shooting, and returning had reached within a mile or two of the bungalow, when, passing by a pleasant river, he thought a bath would be a most renovating luxury; he sent home his servants with an intimation that he would shortly follow. So stripping, and placing his clothes very carefully on a stone, he began to luxuriate in the water. He was a capital swimmer, and had swam to some distance, when to his horror and dismay, on looking to the place where he had left his habiliments, he perceived a dozen monkeys overhauling his entire wardrobe. One was putting his legs through the sleeves of his shirt, another was cramming its head into his trowsers, a third was trying to find whether any treasures were concealed in his boots, while the hat was found a source of wonderment and amusement to some two or three others who were endeavoring to unravel its mystery by ripping the lining and taking a few bites out of the brim. As soon as he had regained his mental equilibrium (for the thing was so ridiculous that it made him laugh heartily), he made with all haste toward the shore; but judge of his perplexity when he saw these mischievous creatures each catch up what he could lay hold of and rattle off at full speed into the jungle. All he heard was a great chattering as they, one by one, disappeared, the last one lugging off his shirt, which, being rather awkward to carry, was continually tripping it up by getting between its legs. And here he staid till the inmates of the bungalow, beginning to suspect some accident, came out in search and found the gentleman sitting in the water up to his neck, in a frame of body and mind which we may conceive to be more easily imagined than described.

A certain family once had a common monkey for a pet. On one occasion the footman had been shaving himself—the monkey watching him during the process—when he carelessly left his apparatus within reach of the creature. As soon as the man was gone out of the the room, to try his imitatorial powers the monkey got the razor and began to scrape away at his throat, as he had seen the footman do, when, alas! not understanding the nature of the instrument he was using, the animal cut its own throat, and before it was discovered bled to death.

Monkeys are very sagacious, and they often undertake robberies with surprising skill and regularity. Their robberies seem to be the result of well-concerted plans. If about to rob an orchard or a vineyard, they set to work in a body. A part enter the inclosure while one is set to watch. The rest stand without the inclosure and form a line reaching all the way from their companions within to their rendezvous without, which is generally some craggy mountain. Everything thus disposed, the plunderers within throw the fruit to those that are without as fast as they can gather it, or if the wall or fence be high, to those that sit on top, and these hand the plunder to those next them on the other side. Thus the fruit is pitched from one to another all along the line, till it is securely deposited at headquarters. During the proceedings they maintain the most profound silence; their sentinel continues on the watch extremely anxious and attentive. But if he perceives any one coming he instantly sets up a loud cry, and at this signal the whole company scamper off. Nor yet are they at any time willing to leave the place empty-handed; for, if they be plundering a bed of melons, for instance, they go off with one in the mouth, one in the hand, and one under the arm. If the pursuit is hot, they will drop first that from under the arm, and then that from the hand; and if it be continued, they at last let fall that which they had hitherto kept in the mouth. A tribe of monkeys called mottled baboons mostly rob in this way; they appear to be under a sort of natural discipline.

Monkeys watch over their young with great assiduity, and appear to educate and train them upon a general plan. Their parents procure for them every possible comfort, and they preserve among them a due share of discipline, and seem even to hold them in subjection; they appear to watch their antics with great delight. Much has been said and written to show that the monkey is simply a lower order than man, and that it is capable of developing into his nature. But this can never be. Like other animals, they rise to the highest point they are created to reach, but cannot transcend it; and this point is entirely outside the domain of reason and the intellectual and moral faculties that are the essential and distinguishing marks of manhood.

COMBATIVENESS OF BIRDS.

BY a fiction of the poets, birds all sing praise, if they sing at all, to the great Creator. Of course, this sounds well, and may have some moral foundation; but I can come as near proving that a catbird curses and swears, and flings out all sorts of abusive epithets at its enemies, when angry, as any one can come to establish the song-praise theory. How these little fellows can fret, and scold, and hiss, and imprecate — yes, imprecate! Let a sparrow-hawk, or screech-owl, or butcher-bird, go near one's nest, and if you observe closely, your imagination must be very torpid, indeed, if you cannot hear "Sacre bleu!" and all that, scattered around pretty freely. I have seen one fairly dance in ecstacy of anger, when nothing but a poor little brown lizard came near it. A pair of catbirds had their nest and young in a currant-hedge of the garden belonging to a farm-house where I was lodging one spring, and I used to amuse myself by exciting the anger of the mother-bird. To do this I had only to hang a bit of red cloth near the nest in her absence, and await the result. No sooner would she return than such a twittering and squeaking and scolding would begin as only a catbird could generate, and when she found there was no fight in the rag, she would eye me sitting at my window, and mew triumphantly as if she well knew who it was who had thus troubled her equanimity. A war of words — or rather a war of notes — is a thing of frequent occurrence between the catbird and a common brown thrush. Early in the morning in the month of May they may be heard screaming their respective medleys at the extremity of their voices from neighboring trees, each songster maliciously bent on drowning the other's voice. The common barnyard cock is given to a like ambition in the matter of crowing down all competitors. Speaking of the brown thrush reminds me that I ought to record right here a very singular combat, witnessed by myself and brother, between one of these gay singers and a blue-jay, and in which the jay was finally discomfited and beaten.

We were lying in the shade of a wide-spreading wild plum tree, on the edge of a little glade. Near us was a clump of sugar-haw bushes, in one of which we had discovered a brown thrush's nest. The bird was incubating. A blue-jay flitting about on mischief intent, as, in fact, a blue-jay always is, happened to spy her, and immediately attacked her, driving her for refuge into the thick, thorny foliage above the nest. This seemed an easy turn for the jay, which at once prepared to have a feast of the eggs. But no sooner had it perched on the rim of the nest than the thrush, with a savage squall, plunged down from its hiding place and struck it a heavy blow on the back. The jay retreated in disorder, but warily returned again when all seemed still. With infinite caution in every movement it hopped from twig to twig, turning its crested head this way and that, till it reached the nest. Again, with a shrill scream, the thrush pounced from its hiding place, using its long, sharp beak for a sword to stab the jay's exposed and defenseless back. Again and again the would-be robber fled and returned, each time to get rougher usage, and finally, as if utterly outdone, with rapidly repeated cries of "De-jay! de-jay! de-jay!" it flitted away into the depths of the woods, to come no more.

GEYSERS OF WYOMING.

PEOPLE who have not had the pleasure of viewing the grandeur of the Yellowstone river, or Sierra Nevada and Coast Range mountains, can have but a slight idea of the magnificence of American scenery. Among the wild mountain cuts, colossal rocks are piled on rocks, and left with perpendicular sides and fronts — ever and anon cleft by that terrible hand which molds the earth. To look up appals, for naught meets the gaze but the cold walls draped with festoons of wild vines and drooping tufts of verdure; to look down, the dashing milk-white river meets the eye, or perhaps the sea-like verdure which, treacherously seeming nearer, relieves the mind from the sense of danger; but wherever you are, at the base of the yawning gulf, at the giddy peak, or upon the cragged side, where man or beast have found and formed a narrow treacherous path, the sublimity silences the beholder into the most profound meditation.

Within the limit of our great National Park there are wonderments in the way of geysers, or boiling and spouting springs, with which those of Europe sink into insignificance when brought into comparison; indeed, so stupendous are they that if all the corresponding phenomena of the whole world could be brought into the same compass beside these they would sink into apparent nothingness.

These geysers are said to be remains of remarkable volcanic manifestations, which began probably in the third formation or tertiary period. At the present time earthquakes are not uncommon there, and often very severe. These wonderful springs were first visited

"OLD FAITHFUL."

some four or five years ago, and are divided into two classes: those which are constantly boiling and spurting, and those whose action is intermittent. The water varies in temperature from 106° to 198° F.

"Old Faithful," so named by Lieut. Doane, stands on a mound thirty feet above the level of the surrounding plain, and throws a column of boiling water, at regular intervals, one hundred and twenty feet high, each discharge lasting some twenty minutes.

"Near the crater, and as far as the irruptive waters reach," writes Lieutenant Doane, "the character of the deposit is very peculiar. Close around the opening are built up walls, eight feet in height, of spherical nodules from six inches to three feet in diameter. These stony spheres, in turn, are covered with minute globules of stalagmite, incrusted with a thin glazing of silica. The rock, at a distance, appears the color of ashes of roses, but near at hand shows a metallic gray, with pink and yellow margins of the utmost delicacy. Being constantly wet the colors are brilliant beyond description. Sloping gently from this rim of the crater in every direction, the rocks are full of cavities in successive terraces, forming little pools, with margins of silica the color of silver, the cavities being of irregular shape, constantly full of hot water, and precipitating delicate, coral-like beads of a bright saffron.

"These cavities are also fringed with rock around the edges in meshes as delicate as the finest lace. Diminutive yellow columns rise from their depths, capped with small tablets of rock, and resembling flowers growing in the water. Some of them are filled with oval pebbles of a brilliant white color, and others with a yellow frost-work which builds up gradually in solid stalagmites. Receding still farther from the crater, the cavities become gradually larger and the water cooler, causing changes in the brilliant colorings, and also in the formations of the deposits. These become calcareous spar, of a white or slate color, and occasionally variegated.

"The water of the geyser is colorless, tasteless, and without odor. The deposits are apparently as delicate as the down on the butterfly's wing, both in texture and coloring, yet are firm and solid beneath the tread. Those who have seen the stage representations of 'Aladdin's Cave,' and the 'Home of the Dragon Fly,' as produced in a first-class theater, can form an idea of the wonderful coloring, but not of the intricate frost-work, of this fairy-like yet solid mound of rock, growing up amid clouds of steam and showers of boiling water. One instinctively touches the hot ledges with his hands, and sounds with a stick the depths of the cavities in the slope in utter doubt in the evidence of his own eyes. The beauty of the scene takes away one's breath. It is overpowering, transcending the visions of the Moslem's Paradise."

As another party of explorers were leaving the basin, ascending the river, this grand old geyser, which stands sentinel at the head of the valley, gave them a magnificent parting display. "With little or no preliminary warning," writes Dr. Hayden, "it shot up a column of water about six feet in diameter to the height of 100 to 150 feet, and by a succession of impulses seemed to hold it up steadily for the space of fifteen minutes, the great mass of water falling directly back into the basin, and flowing over the edges and down the sides in large streams. When the action ceases the water recedes beyond sight, and nothing is heard but the occasional escape of steam until another exhibition occurs. This is one of the most accommodating geysers in the basin, and during our stay played once an hour quite regularly."

Just across the river, and close to the margin, stands a silicious cone, very symmetrical, slightly corrugated on its exterior surface, three feet in height, and five in diameter at its base. Its orifice is oval, with scalloped edges, and two feet by three in diameter. Of this unpretending cone Mr. Langford writes:

"Not one of our company supposed that it was a geyser; and among so many wonders it had almost escaped notice. While we were at breakfast upon the morning of our departure, a column of water, entirely filling the crater, shot from it, which, by accurate triangular measurement, we found to be 219 feet in height. The stream did not deflect more than four or five degrees from a vertical line, and the eruption lasted eighteen minutes."

A hundred yards farther from the river, near the center of the large group of spouting and boiling geysers, is a large oval aperture with scalloped edges, the diameters of which were eighteen and twenty-five feet.

"No water could be discovered," writes Mr. Langford, on his first approach to the spring, "but we could distinctly hear it gurgling and boiling at a great distance below. Suddenly it began to rise, boiling and spluttering, and sending out huge masses of steam, causing a general stampede of our company, driving us some distance from our point of observation. When within about forty feet of the surface it became stationary, and we returned to look down upon it. It was foaming and surging at a terrible rate, occasionally emitting small jets of hot water nearly to the mouth of the orifice. All at once it seemed seized with a fearful spasm, and rose with incredible rapidity, hardly affording us time to flee to a safe distance, when it burst from the orifice with terrific momentum, rising in a column the full size of this immense aperture to the height of sixty feet; and through and out of the apex of this vast aqueous mass, five or six lesser jets or round columns of water, varying in size from six to fifteen inches in diameter, were projected to the marvelous height of two hundred and fifty feet.

"These lesser jets, so much higher than the main column, and shooting through it, doubtless proceed from auxiliary pipes leading into the principal orifice near the bottom, where the explosive force is greater.

"This grand eruption continued for twenty minutes, and was the most magnificent sight we ever witnessed. We were standing on the side of the geyser nearest the sun, the gleams of which filled the sparkling column of water and spray with myriads of rainbows, whose arches were constantly changing — dipping and fluttering hither and thither, and disappearing only to be succeeded by others, again and again, amid the aqueous column, while the minute globules, into which the spent jets were diffused, when falling, sparkled like a shower of diamonds, and around every shadow which the denser clouds of vapor, interrupting the sun's rays, cast upon the column, could be seen a luminous circle radiant with all the colors of the prism, and resembling the halo of glory represented in paintings as encircling the head of divinity. All that we had previously witnessed seemed tame in comparison with the perfect grandeur and beauty of this display. Two of these wonderful eruptions occurred during the twenty-two hours we remained in the valley. This geyser we named 'The Giantess.'"

DESCRIPTION OF AN EARTHQUAKE.

A NOTABLY dreadful and destructive earthquake was that of 1868, in South America, which shook to its base all the adjacent country. It was first noted in Africa, about five o'clock in the morning, its premonitory symptoms being immense clouds of dust, which were seen slowly advancing across the plain in dusky columns at a distance of about ten miles.

Nearer and nearer they came; and in the awful pause of dread expectancy that ensued, the distant snowy peaks of the Cordilleras were observed to nod and reel, as if executing some horribly suggestive cyclopean dance. Gradually this impulse extended itself to the mountains nearer to the town, till the huge *morro* or headland, a little to the left of it, began to rock violently to and fro, heaving with sickening lurches, as if about to cast itself loose into space, and always bringing to again like a hard bestead ship in a driving tempest. As it worked backward and forward, huge fragments of stone detached themselves from its cave-worn surface, and fell with deafening crash into the surf below; while under and above all, like a subdued monotone of horror, was a prolonged, incessant rumble, now like the roll of distant thunder, but ever and anon at irregular intervals swelling into a deafening crash, like the discharge of a whole park of artillery.

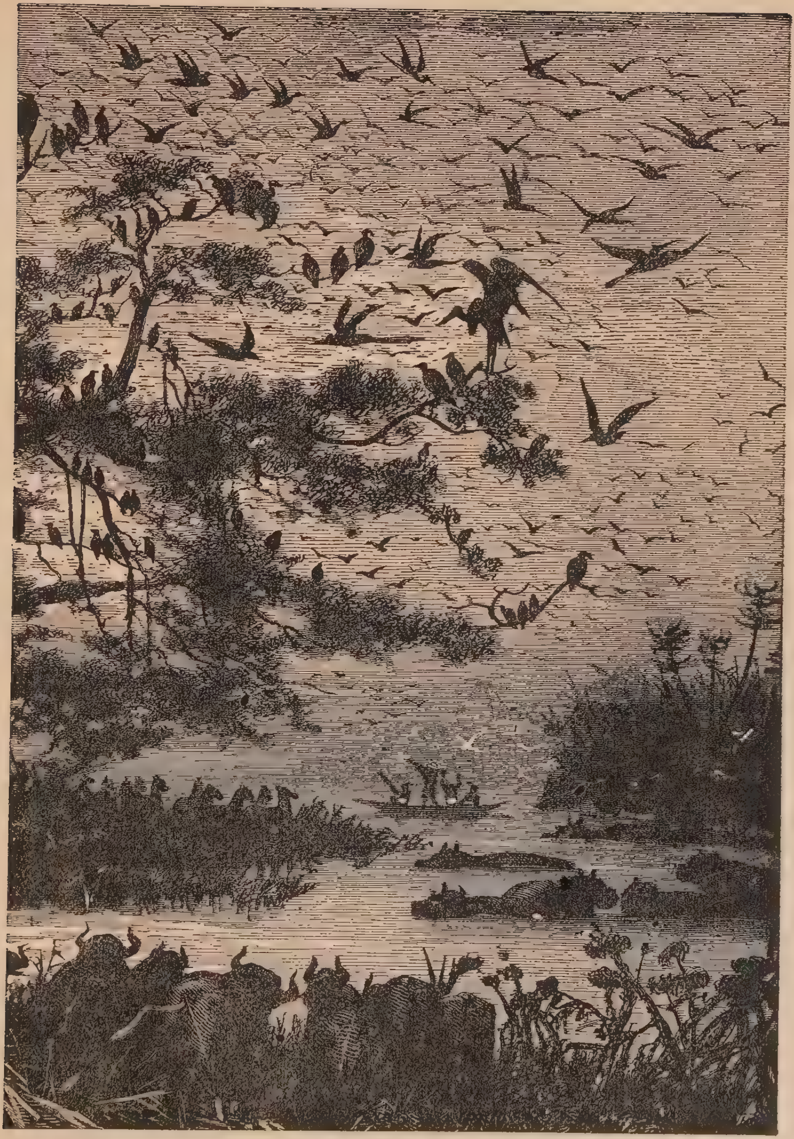
As far as could be seen, the usually solid earth was agitated by a slow wave-like motion, which became first tremulous, and then unspeakably violent, throwing half of the houses into heaps of ruins, and yawning into wide chasm-like fissures, from which mephitic sulphurous vapors issued. Shrieks and groans of anguish filled the air, a mournful interlude shrilly resounding at intervals above all the subterranean thunder, as the terrified crowd rushed to the mole, to seek refuge aboard the vessels in the harbor. Scarcely had they reached this hoped-for haven of safety, when the sea, treacherous as the heaving land, glided softly back, and then rushing forward with a terrific roar, submerged the mole with its panting, terror-stricken occupants, and poured on in a foaming flood over the prostrate town, where it completed the havoc the earthquake had begun. It then rushed back more suddenly than it had advanced, the whole fearful deluge occupying only about five minutes. Again and again the earth quivered and shook, as if about to drop into some unfathomable abyss below, and again the sea dashed forward as if in frantic fury, and then as suddenly recoiled, the last time showing a perpendicular wall of water forty-five feet high, capped by an angry crest of foam. This tremendous wave swept miles inshore, where it stranded the largest ships then lying in the harbor, one of them a United States man-of-war.

SPORTING IN THE TROPICS.

BROCKETTE declares that nowhere can such a paradise for the sportsman be found as in Central South Africa; nowhere can he find in such profusion the largest game for which the hunter seeks. Hunting land animals, of which Cummings and a score of others have told so much, is perhaps no more exciting than sports enjoyed upon lakes and rivers. The writer mentioned has given several stirring narratives of his capturing the hippopotamus, and the following, except the wanton cruelty practiced, is one of the most interesting of his water chases:

"Just as the sun went down I entered a dense reed-cover and came upon the fresh lairs of four hippopotami. They had been lying sleeping on the margin of the river, and as they heard me come crackling through the reeds had plunged into the deep water. I at once ascertained that they were newly started, for the froth and bubbles were still on the spot where they had plunged in. Next moment I heard them blowing a little way down the river. I then headed them, and with considerable difficulty, owing to the cover of the reeds, I at length came right down above where they were standing. It was a broad part of the river, with a sandy bottom, and the water came half way up their sides. There were four of them — three cows and an old bull. They stood in the middle of the river, and though alarmed, did not appear to know the extent of the impending danger.

"I took the sea-cow next to me, and with the first ball gave her a mortal wound, knocking loose a great plate on the top of her skull. She at once commenced plunging round and round, and then occasionally remained sitting for a few moments on the same spot. On hearing the report of my rifle two of the others took up stream and the fourth dashed down the river. They trotted along, like oxen, at a smart pace as long as the water was shallow. I was now in a state of very great anxiety about my wounded sea-cow, for I feared that she would get down into deep water and be lost; her struggles were only carrying her farther down the stream, and the water was becoming deeper. To settle



SPORTING IN THE TROPICS.

the matter I accordingly fired a second shot from the bank, which, entering the roof of the skull, passed out through her eye. She then kept continually splashing round and round in a circle in the middle of the river. I had great fear of crocodiles, and I did not know that the sea-cow might not attack me. My anxiety to secure her, however, overcame all hesitation; so divesting myself of my leathers, and armed with a sharp knife, I darted into the water, which at first took me up to my armpits, but in the middle became shallower.

"As I approached behemoth her eye looked very wicked. I halted for a moment, ready to dive under the water if she attacked me; but she was stunned and did not know what she was doing, so running in upon her, and seizing her short tail, I attempted to incline her course to land. It was extraordinary what strength she still possessed. I could not guide her the slightest, and she continued to splash and blow, and made her circular course, carrying me with her as though I had been a fly on her tail.

"Finding that her tail gave me but a poor hold, as the only means of securing my prey I took out my knife, and cutting two deep parallel incisions through the skin on her rump, and lifting this skin from the flesh so that I could get in my two hands, I made use of this as a handle, and after some desperate hard work, sometimes pushing and sometimes pulling — the sea-cow still continuing her circular course all the time, and I holding on like grim death — eventually I succeeded in bringing her to the bank. Here the bushman quickly brought a stout buffalo rein from my horse's back, which I passed through the opening in the skin, and moored behemoth to a tree. Then I took my rifle and sent a ball through the center of her head, and she was numbered with the dead."

Anderson says that animal life around "watering places," as the lakes are called, is wonderful, rich and varied. The elephant, hippopotamus, buffalo and giraffe have their settlements there, with numerous varieties of the antelope, while the water swarms with crocodiles, some of which are of enormous size.

As he approached near the Zambesi river, says Livingston's records, the country became covered with broad-leaved bushes, pretty thickly planted, and he had several times to shout to elephants to get them out of the way. At an open space a herd of buffaloes came up to look at him and his followers, and one had to be shot before the others would leave them.

The same explorer tells of the multitudes of aquatic birds that gather at that wonderful river. While in his canoe one day with his attendants he brought down four geese at two shots. In his own words: "I never saw a river with so much animal life around and in it, and as the Barotse say, 'its fish and fowls are always fat.'"

COFFEE CULTURE IN BRAZIL.

AGRICULTURE in Brazil is almost a term without significance. This boundless region of the globe is a part of our Father's patrimony, and yet remains to be subdued by his children. We talk about this world being an old world. The word is of bad omen. It is a young world. We are only beginning to fancy what it is, and what its possibilities are, and what it may yet become. Thank God that we live on an earth which is yet in its infancy; that, so far as He is concerned, nobody has been sent on this earth to starve, but that, so far as all external conditions to sustain life and render it happy are concerned, they have been abundantly supplied. It only remains that the internal conditions that are to spring from our own hearts be added to what He has given us and what a magnificent living there is for us all on the face of the earth! In addition to Heaven's supply, give us industry, enterprise and economy, and the proper effort upon the part of man himself, and then what a farm is this for the children of men!

The prosperity of this unsubjugated country depends almost entirely upon its coffee crop, which is the chief product of the land. It is estimated that fully one half of all produced in the world is grown in this empire; two millions of bags are annually shipped, more than half of this amount coming to the United States. Each bag contains one hundred and sixty pounds, and is worth, at Rio Janeiro, twenty dollars per sack — total proceeds, forty millions of dollars.

The coffee is raised chiefly in the southern part of Brazil, in a mountainous belt about two hundred miles in width, and the land upon which it is grown is a yellow sandy soil, lying upon the side hills where no drainage is required, otherwise the natives would never obtain the immense returns.

The trees are usually grown from shoots in nurseries similar to the method of propagating grape vines in this country, yet the berry is sometimes planted and made to produce trees. About three years are required from the transplanting to the beginning of bearing, but have to reach the age of five or six years before they are at the height of their productiveness.

The trees are evergreen, and grow to the height of from ten to thirty feet, and are heavily loaded twice a year with fruitage. They cease bearing at the end of fifteen, or at most twenty years, and are then abandoned. The leaves are some five inches long, and of a pretty bright green color. During nearly the whole of the year white blossoms dot the foliage, giving a fine contrast, there being fruitage in different stages of development all the time, but, as before stated, the regular harvest comes twice every twelve months. The berry, in its tender state, is very pleasant to the taste, and is used as food; that is, the pulpy part. When ripe it becomes red, and later a purplish shade. What we have in our market is simply the pits. The berries grow about as large as good-sized cherries, and are about as palatable as wild plums.

The harvest is made chiefly by women, who carry baskets upon their breasts, and often a baby on the back at the same time. The berries are put into carts, and taken down into the valleys below, where they are spread upon cemented or stone floors and allowed to dry, and sometimes artificial heat is added to advance the work. After drying awhile they are put through a machine or separator; then submerged in water and dried again; then put through a huller and fanning mill. The coffee is now spread and picked over, and all the imperfect kernels taken out, as a few unripe ones in a sack would spoil the whole. It takes nearly seven hundred pounds of the fruit, as it comes from the trees, to make one hundred pounds of the marketable berry.

After the expiration of about twenty years, as before stated, the coffee tree becomes moss covered, similar to old peach trees, and unproductive, and the fields are abandoned and new ones taken, for the people are too lazy to make any effort toward renovating the soil or subjugating the low lands.

In addition to the great production of coffee, tobacco, sugar and cotton are largely grown; but the resources of this extensive country are yet undeveloped. Nearly the whole area of the empire is tillable, and yet but comparatively few acres are improved, and none under thorough cultivation.

* * *

THE PRESUMPTUOUS MURDERER.

A LITTLE more than fifty years ago a man by the name of Henry Thomson called at the house of Mr. John Smith, a resident in a retired part of England, and requested a night's lodging. This request was readily granted, and the stranger having taken some refreshment, retired early to bed, requesting that he might be awakened at an early hour the following morning.

When the servant appointed to call him entered the room for that purpose, he was found in his bed perfectly dead. On examining his body no marks of violence appeared, but his countenance looked extremely natural. The story of his death soon spread among the neighbors, and inquiries were made who he was, and by what means he came by his death.

Nothing certain, however, was known. He had arrived on horseback, and was seen passing through a neighboring village about an hour before he reached the house where he came to his end. And then, as to the manner of his death, so little could be discovered, that the jury which was summoned to investigate the cause returned a verdict that he died "by a visitation of God." When this was done, the stranger was buried.

Days and weeks passed on, and little further was known. The public mind, however, was not at rest. Suspicions existed that foul means had hastened the stranger's death. Whispers to that effect were expressed, and in the hearts of many Smith was considered as the guilty man.

The former character of Smith had not been good. He had lived a loose and irregular life, involved himself in debt by his extravagance; and at length, being suspected of having obtained money wrongfully, he suddenly fled from the town.

More than ten years, however, had now elapsed since his return, during which he had lived at his present residence, apparently in good circumstances, and with an improved character. His former life, however, was now remembered, and suspicion, after all, fastened upon him.

At the expiration of two months a gentleman one day stopped in the place for the purpose of making inquiry respecting the stranger who had been found dead in his bed. He supposed himself to be a brother of the man. The horse and clothes of the unfortunate man still remained, and were immediately known as having belonged to his brother. The body also, itself was taken up, and though considerably changed, bore a strong resemblance to him.

He now felt authorized to ascertain, if possible, the manner of his death. He proceeded, therefore, to investigate the circumstances as well as he was able. At length he made known to the magistrate of the district the information he had collected, and upon the strength of this Smith was taken to jail to be tried for the willful murder of Henry Thomson.

The celebrated Lord Mansfield was then on the bench. He charged the grand jury to be cautious as to finding a bill against the prisoner. The evidence of his guilt, if guilty, might be small. At a future time it might be greater; more information might be obtained. Should the jury now find a bill against him, and should he be acquitted, he could not be molested again, whatever testimony should rise up against him. The grand jury, however, did find a bill, but it was by a majority of only one.

At length the time of trial arrived. Smith was brought into court and placed at the bar. A great crowd thronged the room, eager and anxious to see the prisoner and to hear the trial. He himself appeared firm and collected. Nothing in his manner or appearance indicated guilt; and when the question was put to him by the clerk, "Are you guilty, or not guilty?" he answered with an unfaltering tongue, and with a countenance perfectly unchanged, "Not guilty."

The counsel for the prosecution now opened the case. But it was apparent that he had little expectation of being able to prove the prisoner guilty. He stated to the jury that the case was involved in great mystery. The prisoner was a man of respectability and of property. The deceased was supposed to have had about him gold and jewels to a large amount; but the prisoner was not so much in want of funds as to be under a strong temptation to commit murder. And, besides, if the prisoner had obtained the property he had effectually concealed it. Not a trace of it could be found.

Why, then, was the prisoner suspected? He would state the grounds of suspicion. The deceased, Henry Thomson, was a jeweler, residing in London, and a man of wealth. He had left London for the purpose of meeting a trader at Hull, of whom he expected to make a large purchase. That trader he did meet; and after the departure of the latter, Mr. Thomson was known to have had in his possession jewels and gold to a large amount.

With these in his possession he left Hull on his return to London. It was not known that he stopped until he reached Smith's, and the next morning was discovered dead in his bed. He died, then, in Smith's house, and if it could be shown that he came to his death in an unnatural way, it would increase the suspicion that the prisoner was in some way connected with the murder.

Now, then, continued the counsel, it will be proved beyond the possibility of a doubt that the deceased died by *poison.* But what was that poison? It was a recent discovery of some German chemists, said to be produced from distilling the seed of the wild cherry tree. It was a poison more powerful than any other known, and deprived of life so immediately, as to leave no marks of suffering, and no contortions of the features.

But, then, the question was, by whom was it administered? One circumstance, a small one indeed, and yet upon it might hang a horrid tale, was that the stopper of a small bottle of a very singular description had been found in the prisoner's house. That stopper had been examined, and said by medical men to have belonged to a German vial containing the kind of poison which he had described. But, then, was that poison administered by Smith, or at his instigation? Who were the prisoner's family? It consisted only of himself, a housekeeper, and one man-servant. The man-servant slept in an out-house adjoining the stable, and did so on the night of Thomson's death. The prisoner slept at one end of the house, the housekeeper at the other, and the deceased had been put in a room adjoining the housekeeper's.

It would be proved, that about three hours after midnight, on the night of Thomson's death, a light had been seen moving about the house, and that a figure holding the light was seen to go from the room in which the prisoner slept to the housekeeper's room; the light now disappeared for a minute, when two persons were seen, but whether they went into Thomson's room the witness could not swear; but shortly after they were observed passing quite through the entry to Smith's room, into which they entered, and in about five minutes the light was extinguished.

The witness would further state that, after the person had returned with the light into Smith's room, and before it was extinguished, he had twice perceived some dark object to intervene between the light and the window, almost as large as the surface of the window itself, and which he described by saying it appeared as if a door had been placed before the light. Now, in Smith's room, there was nothing which could account for this appearance; his bed was in a different part; and there was neither cupboard nor press in the room, which, but for the bed, was entirely empty, the room in which he dressed being at a distance beyond it.

The counsel for the prosecution here concluded what he had to say. During his address Smith appeared in no wise to be agitated or distressed; and equally unmoved was he while the witnesses testified in substance what the opening speech of the counsel led the court and the jury to expect.

Lord Mansfield now addressed the jury. He told them that, in his opinion, the evidence was not sufficient to condemn the prisoner; and that if the jury agreed with him in opinion, the court would discharge him. Without leaving their seats the jury agreed that the evidence was not sufficient.

At this moment, when they were about to render a verdict of acquittal, the prisoner rose and addressed the court. He said that he had been accused of a foul crime, and the jury had said that there was not sufficient evidence to convict him. Did the jury mean that there was *any evidence* against him? Was he to go out of court with suspicions resting upon him after all? This he was unwilling to do. He was an innocent man, and if the judge would grant him an opportunity, he would prove it. He would call his housekeeper, who would confirm a statement which he would now make.

The housekeeper had not appeared in court. She had concealed herself, or had been concealed by Smith. This was considered a dark sign against him. But he himself now offered to bring her forward, and stated as the reason, not that he was unwilling that she should testify, but knowing the excitement, he was fearful that she might be bribed to give testimony contrary to fact. But he was now ready to relate all the circumstances he knew; she might, then, be called and be examined. If her testimony does not confirm my story, let me be condemned.

The request of the prisoner seemed reasonable, and Lord Mansfield, contrary to his usual practice, granted it.

The prisoner went on with his statement. He said he wished to go out of court relieved from the suspicions which were resting upon him. As to the poison, by means of which the stranger was said to have died, he knew neither the name of it, nor the effect of it, nor even of the existence of it, until made known by the counsel. He could call God to witness the truth of what he said.

And, then, as to Mr. Thomson, he was a perfect stranger to him. How should he know what articles of value he had with him. He did not know. If he had such articles at Hull, he might have lost them on the road; or, which was more probable, have otherwise disposed of them. And if he died by means of the fatal drug, he must have administered it himself.

He begged the jury to remember that his premises had been repeatedly and minutely searched, and that not the most trifling article that belonged to the deceased had been discovered in his possession. The stopper of a vial had been found, but of this he could only say he had no knowledge, and had never seen it before it was produced in court.

One fact had been proved, and only one. That he would explain, and his housekeeper would confirm his statement. A witness had testified that some one had gone to the bedroom of the housekeeper on the night in question. He was ready to admit that it was he himself. He had been subject for many years of his life to sudden fits of illness; he had been seized with one on that occasion, and had gone to her to procure her assistance in lighting a fire. She had returned with him to his room for that purpose, he having waited for a minute in the passage, while she put on her clothes. This would account for the momentary disappearance of the light. After remaining a few minutes in his room, finding himself better, he had dismissed her, and retired to bed, from which he had not risen when he was informed of the death of the guest.

Such was the prisoner's address, which produced a powerful effect. It was delivered in a very firm and impressive manner; and from the simple and artless manner of the man, perhaps not one present doubted his entire innocence.

The housekeeper was now introduced, and examined by counsel for the prisoner. She had not heard any part of the statement of Smith, nor a single word of the trial. Her story confirmed all that he had said.

To this succeeded her cross-examination by the counsel for the prosecution. One circumstance had made a deep impression on his mind; this was, that while the prisoner and the housekeeper were in the room of the former, something like a door had obstructed the light of the candle, so the witness testified to the fact, but could not see it. What was the obstruction? There was no door — nothing in the room which could account for this. Yet the witness was positive that something like a door did, for a moment, come between the window and the candle. This needed explanation. The housekeeper was the only person that could give it. Designing to probe this matter in the end to the bottom, but not wishing to excite her alarm, he began by asking her a few unimportant questions, and among others, where the candle stood while she was in Mr. Smith's room.

"In the center of the room," she replied.

"Well, and was the closet, or cupboard, or whatever you call it, opened once or twice while it stood there?"

She made no reply.

"I will help your recollection," said the counsel; "after Mr. Smith had taken the medicine out of the closet, did he shut the door, or did it remain open?"

"He shut it."

"And, when he replaced the bottle in the closet, he opened it again, did he?"

"He did."

"And how long was it open the last time?"

"Not above a minute."

"Well, and when open, would the door be exactly between the light and the window?"

"It would."

"I forget," said the counsel, "whether you said the closet was on the right or the left hand side of the window?"

"On the left hand side."

"Would the door of the closet make any noise in opening?"

"None."

"Are you certain?"

"I am."

"Have you ever opened it yourself, or only seen Mr. Smith open it?"

"I never opened it myself."

"Did you ever keep the key?"

"Never."

"Who did?"

"Mr. Smith, always."

At this moment the housekeeper chanced to cast her eye toward Smith, the prisoner. His countenance suddenly changed. A cold, damp sweat stood upon his brow, and his face had lost all its color. He appeared a living image of death. She no sooner saw him than she shrieked and fainted. The consequence of her answers flashed across her mind. She had been so thoroughly deceived by the manner of the advocate, and by the little importance he had seemed to attach to her statements, that she had been led on by one question to another, till she had told him all he wanted to know.

She was obliged to be taken from the court, and a physician, who was present, was requested to attend her. At this time the solicitor for the prosecution (answering to our state's attorney), left the court, but no one knew for what purpose. Presently the physician came into court, and stated that it would be impossible for the housekeeper to resume her seat in the box short of an hour or two.

It was about twelve in the day. Lord Mansfield, having directed that the jury should be accommodated with a room, where they could be kept by themselves, adjourned the court two hours. The prisoner in the meantime was remanded to jail.

It was between four and five o'clock when the judge resumed his seat upon the bench. The prisoner was again placed at the bar, and the housekeeper brought in and led to the box. The court-room was crowded to excess, and an awful silence pervaded the place.

The cross-examining counsel again addressed the housekeeper. "I have but a few more questions to ask you," said he; "take heed how you answer, for your own life hangs upon a thread."

"Do you know this stopper?"

"I do."

"To whom does it belong?"

"To Mr. Smith."

"When did you see it last?"

"On the night of Mr. Thomson's death."

At this moment the solicitor entered the court, bringing with him upon a tray, a watch, two money-bags, a jewel-case, a pocket-book, and a bottle of the same manufacture as the stopper, and having a cork in it. The tray was placed on the table in sight of the prisoner and the witness, and from that moment not a doubt remained in the mind of any man of the guilt of the prisoner.

A few words will bring this melancholy tale to its close. The house, where the murder had been committed, was between nine and ten miles distant. The solicitor, as soon as the cross-examination of the housekeeper had discovered the existence of the closet and its situation, had set off on horseback, with two sheriff's officers, and, after pulling down a part of the wall of the house, had detected this important place of concealment. Their search was well rewarded; the whole of the property belonging to Mr. Thomson was found there, amounting in value to some thousand pounds; and to leave no room for doubt a bottle was discovered, which the medical men instantly pronounced to contain the very identical poison which had caused the death of the unfortunate Thomson. The result was too obvious to need explanation.

It scarcely need be added that Smith was convicted and executed, and brought to this awful punishment by his own means. Had he said nothing—had he not persisted in calling a witness to prove his innocence, he might have escaped. But God had evidently left him to work out his own ruin, as a just reward of his awful crime.

A FLOATING CITY.

ONE of the most wonderful cities in the world is Bangkok. It is the capital of Siam, and is situated on — or rather in — the great river Meinam. We find the following graphic account of it in a volume of recent travels — "The Capital of Siam." Did you ever witness such a sight in your life? On either side of the wide, majestic stream, moored in regular streets and alleys, and extending as far as the eye can reach, are upward of 70,000 neat little wooden houses, each house floating on a compact raft of bamboos; and the whole intermediate space of the river presents to our astonished gaze one dense mass of ships, junks and boats, of every conceivable shape, color and size. As we glide along among these, we occasionally encounter a stray floating house, broken loose from its moorings, and hurrying down the stream with the tide, amidst the uproar and shouts of the inhabitants and all the spectators. We also observe that all the front row of houses are neatly painted shops in which various tempting commodities are exposed for sale; behind these again, at equal distances, rise the lofty and elegant porcelain towers of the various watts and temples. On our right-hand side, far away as we can see, are three stately pillars, erected to the memory of three defunct kings, celebrated for some acts of valor and justice; and a little beyond these, looming like a line-of-battle ship among a lot of cockle-shells, rises the straggling and not very elegant palace of the king, where his Siamese majesty, with ever so many wives and children, resides. Right ahead, where the city terminates, and the river, making a curve, flows behind the palace, is a neat-looking fort, surmounted with a tope of mango trees, over which peep the roofs of one or two houses, and a tall flagstaff, from which floats the royal pennant and jack of Siam — a flag of red ground-work, with a white elephant worked into the center. That is the fort and palace of Prince Chou Fau, now King of Siam, and one of the most extraordinary and intellectual men in the East. Of him, however, we shall see and hear more, after we have bundled our traps on shore and taken a little rest. Now, be careful how you step out of the boat into the balcony of the floating house, for it will recede to the force of your effort to mount, and if not aware of this you lose your balance and fall into the river. Now we are safely transshipped, for we cannot as yet say landed; but we now form an item, though a very small one, of the vast population of the city of Bangkok.

We take a brief survey of our present apartments, and find everything, though inconveniently small, cleanly and in other respects comfortable. First, we have a little balcony which overhangs the river, and is about twenty yards long by one and a half broad. Then we have an excellent sitting-room, which serves us for parlor, dining-room and all; then we have a little side room for books and writing; and behind these, extending the length of the other two, a bedroom. Of course we must bring or make our own furniture; for, though those houses inhabited by the Chinese are pretty well off on this score, the Siamese have seldom anything besides their bedding materials, a few pots and pans to cook with, a few jars of stores and a fishing-net or two. Every house has a canoe attached to it, and no nation detests walking so much as the Siam-

THE BRIDGE OF SIGHS.

ese; at the same time they are all expert swimmers, and both men and women begin to acquire this very necessary art at a very early age. Without it a man runs momentary risk of being drowned, as, when a canoe upsets, none of the passers-by ever think it necessary to lend any aid, supposing them fully adequate to the task of saving their own lives. Canoes are hourly being upset, owing to the vast concourse of vessels and boats plying to and fro; and, owing to this negligence or carelessness in rendering assistance, a Mr. Benham, an American missionary, lost his life some twelve years ago, having upset his own canoe when it was just getting dusk, and though surrounded by hundreds of boats, not one deemed it necessary to stop and pick the poor man up.

In Siam a kind of rascality is continually being carried on under cover of friendship or by sleight of hand, and the victim finds no one more sympathizing than the one who has fleeced him.

One of the government officers received of a neighbor of mine five hundred Mexican dollars, for which he was to receive *ticals*, the legal coin of the Siamese. A large portion of the ticals that circulate in the country are counterfeit, being simply copper plated with silver. They are precisely the same weight and size as the silver tical. How the make-up is conducted to secure this I have never known; I simply know that the substance plated is called copper. To the ordinary observer the genuine and the counterfeit tical look alike, but there are those who are called "money lookers" who seem to know a good or a bad tical at sight.

My neighbor took one of those professional detectives and went to the prince for his money. The inspector looked it over and pronounced it all good, when it was received and deposited in the home treasury. But it was afterward found that full half of it was counterfeit. The inspector could nowhere be found, and when the prince was notified of the fact he simply said: "It's bad, truly, but according to Siamese law and usage, when you accepted the money my responsibility was at an end. Probably your servants in some way have taken away your good ticals and put bad ones in their place. The common Siamese great thieves, very."

I was afterward told that this inspector was sent by the prince to help him effect his cheat. The prince was as bland and childlike as possible, and expressed the strongest sympathy for his very dear friend who had suffered such a loss. Once after this, when I was at the palace of this same prince, he said to me with a smile: "Missionary cheat easy when he first come, but after a while he gets wisdom."

Down the river a native merchant kept a supply store, to which foreigners were accustomed to resort for stores. He was a nabob of his line and supported a grave dignity. Usually during business hours he could be seen sitting on an embroidered mat on a raised platform, and a servant lying at his side and blowing him with a long-handled decorated fan. He acted as cashier and general director, was very genial and affable, and made his customers feel that he was doing his whole business with special reference to their interests. It was often remarkable to see how cheap he would sell just for friendship's sake, "seeing it's you," and then he would seem happy in view of the fact that he had lost and you gained. Yet it was said that no one made money faster than he. He was very popular, but yet with the foreigners there was a secret suspicion that somehow he was fooling them all the time.

At length the fact came out that while he was selling goods at reduced prices, he was swindling his customers most egregiously. This not by poor articles or short weight, for he always kept good articles and gave full measure. His trick was this: When you made your purchase, he would receive your money, and in the most public way would look at it for a moment according to custom, and then hand it back with the words, "please exchange," i.e. please give me other ticals in place of these. Ask him if those are not good; "Oh, yes," he would say, "but I have to be very particular and get money that looks first-rate, or I should lose some, and as I sell so very cheap, I cannot afford to lose one bat (tical)." This of course would be satisfactory, and you would let him select from what you have.

As you turn your boat homeward you smile with satisfaction because you have bought your goods so cheaply, and settle your mind to always patronize him. At the same time he is laughing inwardly because he received pay for his goods twice over. You think you have paid him, say five ticals, but in fact you have paid him ten. In his left-hand sleeve were counterfeit ticals in store for use. When you give him the first ticals he seems to hold them up before his face a moment, turning them over with his right forefinger. As he hands them back for you to exchange, somehow the ticals you gave him have gone down into his sleeve, and five counterfeits have come up. You would swear, probably, that no change was made, and yet the fact is that you go away with five counterfeits, and he pockets ten good ones that you brought with you.

A native told me what was done, so to test it I marked a tical, and then as nearly as I could followed the usual custom. I gave him my ticals; he held it up between his thumb and finger for a moment as if examining it, then handed it back with a kaw plem (please exchange). I looked, and lo! it was not the one I gave him. I told him so, but his resentment was so terrible that I was sorry I made the charge. I quit trading with him and went to be cheated in other places.

No doubt the heathen Siamese can be imposed upon by the civilized, and outwitted in some things, but while this is being done it is not at all certain that the native will not at last come out ahead.

* * *

JUGGLERS OF INDIA.

REV. MR. CAUNTER gives a description of "the basket trick" which he witnessed in India: A stout, ferocious-looking fellow stepped forward, with a common wicker basket of the country, which he begged we would carefully examine. This we accordingly did; it was of the slightest texture, and admitted the light through a thousand apertures. Under this fragile covering he placed a child about eight years old, an interesting little girl, habited in the only garb which nature had provided for her, perfect of frame and elastic of limb — a model for a cherub, and scarcely darker than a child of southern France. When she was properly secured, the man, with a lowering aspect, asked her some question, which she instantly answered, and, as the thing was done within a few feet from the spot on which we were seated, the voice appeared to come so distinctly from the basket that I felt at once satisfied there was no deception.

They held a conversation for some moments, when the juggler, almost with a scream of passion, threatened to kill her. There was a stern reality in the whole scene which was perfectly dismaying; it was acted to the life, but terrible to see and hear. The child was heard to beg for mercy, when the juggler seized a sword, placed his foot upon the frail wicker covering under which his supposed victim was so piteously supplicating his forbearance, and to my absolute consternation and horror, plunged it through, withdrawing it several times and repeating the plunge with all the ferocity of an excited demon.

By this time his countenance exhibited an expression fearfully indicative of the most frantic of human passions. The shrieks of the child were so real and distracting that they almost curdled for a few moments the whole mass of my blood; my first impulse was to rush upon the monster, and fell him to the earth; but he was armed and I defenseless. I looked at my companions — they appeared to be pale and paralyzed with terror; and yet these feelings were somewhat neutralized by the consciousness that the man could not dare to commit a deliberate murder in the broad eye of day, before so many witnesses; still the whole thing was appalling.

The blood ran in streams from the basket; the child was heard to struggle under it; her groans fell horribly upon the ear; her struggles smote painfully upon the heart. The former were gradually subdued into a faint moan, and the latter into a slight rustling sound; we seemed to hear the last convulsive gasp which was to see her innocent soul free from the gored body, when, to our inexpressible astonishment and relief, after muttering a few cabalistic words, the juggler took up the basket, but no child was to be seen. The spot was indeed dyed with blood; but there was no mortal remains, and, after a few moments of undissembled wonder, we perceived the object of our alarm coming toward us from among the crowd.

She advanced and saluted us, holding out her hand for our donations, which we bestowed with hearty good will; she received them with a most graceful salaam, and the party left us well satisfied with our more than expected gratuity. What rendered the deception the more extraordinary was, that the man stood aloof from the crowd during the whole performance — there was not a person within several feet of him.

TRAINED ELEPHANTS.

HUGE and powerful as the elephant is, it is easily brought under control by man, and soon learns to understand and obey his orders. He will carry with his trunk the timber intended for building and other purposes, and sometimes the ends of the beams are tied with a rope, which the elephant twists round his trunk, and thus drags the load behind him. He draws with ease a block of wood that twenty-five men can hardly move.

Elephants also carry heavy burdens on their backs, their necks, their tusks, and even in their mouths.

They never break or injure anything committed to their charge. From the banks of the rivers they put their burdens into boats without wetting them, laying them gently down, and arranging them where they ought to be placed.

They have been extensively used in India from remote times; and the English now use them just as the natives always have done. They are so exceedingly useful that the government has wisely forbidden the killing of any of them, under severe penalties, and it permits the hunting of them only to those who will be careful not to injure them.

In the regions where elephants live, the elephant catchers make a large, strong pen of beams and logs of wood, the upright parts being set very deep in the ground, so as to stand firm. From the large pen there is an opening into a smaller one, and from this into another still smaller. After the pens are all ready, many hundred men surround a large herd of elephants and begin to drive them toward the pens. As elephants are very much afraid of fire, the men build fires at night, and these keep the elephants from trying to get out of the ring which the men have formed around them. During the daytime the people keep up a loud noise with drums, rattles, and the firing of muskets. The elephants are thus gradually driven nearer and nearer to the pens, and at last the herd, or a part of it, is made to enter the large pen, the entrance to which is at once tightly closed.

The elephants now perceive that they are entrapped, and bellow loudly with rage, but seeing no passage except into the next pen, after some delay they enter it in the hope of escape. Finally they enter the smallest of the pens; from this a long passage

ELEPHANTS IN THEIR NATIVE STATE.

leads to the open country, but so narrow that the elephant cannot turn around in it, and only one animal at a time can pass along. Into this passage the elephants, one by one, are driven or coaxed by food; and as soon as one ventures in, the door behind him is quickly closed; he is then bound with strong ropes, and a strong rope is also put around his neck, and each end of the rope is fastened to a well-trained tame elephant, and thus the tame elephant helps his master to take the captured one to two large trees, to both of which he is securely fastened.

The elephant at first struggles, and tries hard to get away, but soon he becomes tired out, and weak and hungry, and is willing to eat the food which is brought to him, and so he grows more and more tame each day, and at last he comes to like the man who brings him food, and obeys him as his master.

In their wild state they never try to hurt smaller animals, and if a wounded man or little child be in their way, they will remove him carefully and pass on. When a herd is on its march through the forests, the large male elephants put themselves in the front and tear down branches and uproot trees, to clear the way for the females, the young, and those that are feeble through age, who follow behind.

If they act thus while in their wild state, we may imagine how gentle and careful they are when tamed and treated kindly. They are very fond of little children, and Hindoo mothers often leave their little ones in their charge. The mother will place her babe on the grass, under the shade of a large tree, and will say to the elephant, "Mind the baby," and he will keep the most careful watch of it, and if it walks or creeps from under the shade, he will very gently enfold it with his trunk and carry it back. If flies or mosquitoes trouble the little one, he will tear off a branch from the tree and keep them off, and the child is no more afraid of the immense but kind animal than a little one with us is of the family dog. It is wonderful, too, with what gentleness and care these enormous animals will make their way through crowded streets of Indian cities, gently touching with their trunks those who are in their way, and never hurting anybody.

Elephants have a decided liking for military life. Various regiments while serving in the East have had such an animal, which often rendered good service to the corps to which he might be attached. The King's Rangers at one time were in possession of a fine male of enormous size, which for many years was never once absent from parade. As soon as the bugle sounded he would walk majestically to the place of muster, and take up his position at the right of the column. If the mahout or driver presented himself, the elephant would lift him onto his shoulders by means of his trunk, and evidently without the slightest effort to himself; but if left to his own unaided intelligence, he obeyed the ordinary words of command without ever making a mistake, such as: "Right face," "March," "Mark time," "Halt." He insisted at all times on giving help to the men whenever they were engaged in loading or unloading baggage, and was evidently pleased to be allowed to make himself useful. When the wagons were impeded on the march, as it not infrequently happened, Jock was duly sensible of his own importance, for by his enormous strength he would push a heavy load up a steep declivity, which six or eight oxen failed to do without his assistance.

It happened that the Rangers were suddenly ordered to embark for China, and there was no accommodation for taking Jock on shipboard. To the great disappointment of the men, the authorities decided that he should be left in India. He was, however, permitted to accompany the regiment as far as the quay to watch the troops as they went on board, many of whom had a parting word of kindness for their old comrade. "Good-bye, old man," and "Poor old Jock," were repeated, with many variations, both by officers and men. Meanwhile the animal watched the proceedings with great apparent interest, as if wondering when his own turn would come to go on board. But when the vessel steamed off and left him ashore he became frantic with rage and disappointment. It had been proposed that he should be transferred to another corps, but he most persistently refused to have anything to do with it. Neither the coaxing nor the threats of his mahout were of any avail. Though he had previously manifested the gentlest disposition, he now threateningly withstood all kindly advances on the part of his would-be comrades, and at length so savage did he become that it was deemed expedient to place him in confinement. Even the mahout himself was several times placed in a very awkward predicament, and on one occasion barely escaped with his life. No means could be found to assuage the grief or to calm the anger of this faithful creature, which so constantly mourned the loss of his friends. But in little less than two years the Rangers came back to their old quarters, and were informed of the melancholy change which had come over their old comrade.

"No go near — no touch, sahib; he strike hard," said the mahout; "he kill."

"Why Jock, my boy," said a young officer, formerly one of his special friends, "why, what's the matter?"

The animal pricked up his ears, and instantly recognized the voice, which was proved by his manifesting unmistakable signs and sounds of joy. It was quite affecting to see, when once more he was permitted freely to repair to the parade-ground, with what kindly recognition he embraced many of his companions, placing his trunk tenderly on their neck and shoulders. I need hardly say he was at once reinstated in his old regimental post, the duties of which he recommenced to discharge as if no interruption had taken place.

THE ANTARCTIC REGION.

A SUPERFICIAL thought would lead one to suppose that as we leave the barren, icy, desolate regions of the polar world, and come next into the temperate regions, so on to the tropical belt, or torrid zone, with its astonishing luxuriance of animal or vegetable life, that exploration would round off and finish in these scenes of magnificent and sweltering beauty; but not so. Beyond this the south pole, or Antarctic region, stretches wild, frozen, and infinitely desolate, so that the vivid fancy causes the mind to recoil from contemplating the terrible picture.

At the north, the indomitable explorer sees open channel-ways beckoning him each year to fresh exertions and new discoveries; but in this awful Antarctic ocean, impregnable breastworks of ice hem in their farther progress. Not a flower here, only blades of coarse grass; even the invincible mosses of frozen countries fail to "put in a strong appearance" in this forsaken region. This country of the South Pole — if one may speak of it in this way — is described, by the few hardy men who have gone down to that sea in ships, as awful beyond description. Icebergs shifting under the impenetrable fogs, and pushing glistening, flinty promontories out before the straining ship, and projecting in slippery, merciless cliffs as if about to fall upon the doomed vessel's decks. Occasionally the yielding of one of the frozen crags to its accumulating weight broke it asunder; and while the awe-struck sailors watched through the solemn, fog-walled night, they heard fierce hissings and horrible rushing noises and heavy detonations like submarine explosions, or the cannonading of some monster giants behind their fortresses of everlasting ice.

No fur-clad human being here to lift the inquiring glance at the strange ships riding at anchor outside the glacier-walled coast; no companionable animal crossing with swift foot or investigating tread upon these barren peaks, only the shrill screams of the sea fowl riding on the drift ice, or taking their swift or sluggish flights over frozen cape, promontory, hill, or vale. Here congregate the petrel family of several species; the giant petrel or cannibal, it should be termed — even devouring its own kind if one happens to be wounded; and the albatross and penguin also frequent this locality. The hoarse voices of the latter make a diabolical clatter when any number of them become excited.

Whales and dolphins are found in this ocean, also seals of the species called sea elephants, because of their monstrous size; and although they present a formidable appearance when enraged, they are very easily killed by the hunter.

The explanation of the colder and more barren aspect of the South Pole than that of the North, is found in the fact, that while there is much land, mountains, hills, and forests in the Arctic country, the predominance of ocean in the Antarctic, the flatter inland surface of country, and the constant detachment of immense bodies of ice, and its continuous falling into the sea, keeps the temperature down to a remarkable degree of coldness; and we are led to wonder, if in the endless changes of worlds and time, in the planets moving from east to west and from north to south, the future of the poles will be different from its present. We believe it may be so. The seasons may change or soften their rigors there, and some Heaven-sent bird or messenger will bear away to those remote and forsaken countries the germs of a new existence. Some island sloughing from the known continents, or from unknown ones — seed strewn, vigorous and adhesive — may rest its foot upon some hidden anchorage and become the central points of a new country.

With God all things are possible, and with an eye of faith glancing down the coming time, we believe that science, aided by divine inspiration, will revel in discoveries undreamed of by the present generation. With exultant foreknowledge, we cry: “Speed the mind that seeks for the unspeakable riches of God’s creation.”

BAFFIN'S BAY BY MOONLIGHT.

THE cold, silent moon looks down on a sea-like bay, the dark waters dotted by gigantic icebergs and an immense ice-pack, which lies like a barrier, menacing the daring mortal who would penetrate to the secrets of the north.

No cities will ever dot its shores, no busy hum of cultivation, trade or factory.

The discoverer of this bay, one of the finest in the world, was William Baffin.

In 1612 he had made a voyage with Hall, one of the men who had been employed in the Danish expedition; and that voyage is remarkable as the first on record in which, by an observation of the heavenly bodies, a method was adopted for taking the longitude at sea. Baffin had also made a voyage to Greenland previous to his employment by the company.

It was in 1615 that the command of the Discovery was given to Bylot, and Baffin appointed as his mate. Being far the better educated of the two, he seems to have really directed the course of the expedition; and some of his lunar observations on the occasion were made with so much accuracy, that, two centuries later, they called forth the praise of Captain Parry, who always held Baffin in great respect.

No very particular discovery is recorded as the result of this voyage, though it added, perhaps, a good deal to the general knowledge of those parts. But next year the same ship and officers were again sent out, and with such confident anticipation of success that they were ordered to bring back a Japanese on their return.

They sailed direct for Davis' strait, up which they continued in a northerly direction until they came to Cape Dudley Digges, Whale sound and Cary's isles, in the very north of what has since been called Baffin's bay, but which they supposed, as it now proves truly, to be open sea. Under that idea they were constantly trying to make their way westward, though fruitlessly, on account of the ice.

In July, however, this began to melt very fast, and they continued coasting along to the north until they came to an island to which they gave the name of Hackluyt, after Sir Richard Hackluyt, the first compiler of a volume of voyages; then on to Smith's sound, at the extreme end of the bay; and next round by the western side to Jones' sound, to both of which they gave the names.

At length they began to suspect that they were in a great bay, and not in the open sea at all, and their hopes became daily less and less. But in their southward course they passed another great inlet, Sir James Lancaster's sound, little thinking that it led into an open strait, for it was barred by ice; nor was it until Parry's time that this barrier was passed, and the passage to the open ocean this way discovered. Coasting along as close to the shore as they could, they now pursued their way down the western side, until, arrived once again in Davis' strait, they came to Cumberland's island, where a consultation was held, in which it was decided, "that having come to an end of their discovery, they should cross to the coast of Greenland to see if they could get some refreshments for their men."

Accordingly they anchored in Cockin sound, so named by that Hall who had accompanied the Danish Admiral Lindenau, and thence, on the 1st of August, they steered their way home.

Little more is known of the after life of Baffin, except that he joined in the British attempt to expel the Portuguese from the Persian gulf, and that at the siege of a small fort near Ormuz he was killed.

In a letter to one of the gentlemen who sent him out, Baffin speaks of the "worst being now known concerning the passage," and declares that "there is no passage or hope of a passage in the north of Davis' strait"; but he dwells on the advantages of the discoveries which had been made thereabouts, and of the vast numbers of whales to be caught in those seas.

RUINS OF POMPEII.

TO alight from a railway train, to purchase a ticket of admission, to negotiate with a guide, and then, after walking a couple of hundred yards, to find oneself transported back and brought face to face with the every-day life of eighteen centuries ago, is to experience a sensation which no subsequent visiting of famous relics of the past can ever efface from the mind. An ancient ruin is but a heap of stone, whether in Mexico or in Egypt. The massive blocks of Stonehenge or those of the Ephesian Temple of Diana mean nothing to those who, from their knowledge and imagination, cannot call up mental pictures of the circumstances under which they were erected; and it requires no small effort on the part of even those possessing the appreciative faculty to exercise it, when a locality hitherto surrounded by a halo of romance, sentiment, or historical interest, is for the first time viewed from the window of a nineteenth-century railway train. Pompeii is perhaps the one exception. Tourists who have wearily ascended Pisa's leaning tower and thought of nothing but the steepness of the stairs, or who have "done" the Acropolis at Athens at sunrise, with the idea of breakfast uppermost in their minds, find in the exhumed city an interest which leaves no room for such incongruous feelings. It is the interest which attaches to all things personal, the same interest which induced thousands at the Centennial to turn their backs on the magnificent Castellani collection of antiquities and linger in the New England kitchen.

To reach Pompeii from Naples, a fifty-minutes journey by the railroad which skirts the bay is necessitated. The line cuts through the great lava stream of 1794, over two thousand feet wide and forty feet thick, at the base of Vesuvius, and passes a number of little villages, inhabited (in face of constant danger from earthquake) on account of the great fertility of the soil. On reaching his destination, the visitor pays a small admission fee, and enters at once into the streets of the ancient city.

Pompeii was partly destroyed by two earthquakes in the year 63 A.D. Its inhabitants were still engaged in rebuilding the injured portion, when, on August 24, 79, a great eruption of Vesuvius overwhelmed the city and adjacent towns of Herculaneum and Stabiæ. So sudden was the outbreak that the escape of the people was prevented. A dense cloud of black smoke burst forth from the crater and settled quickly over the town, plunging it in complete darkness. A dense rain of thin light ashes followed, and then showers of hot stones, mingled with masses of lava giving off mephitic gases. Meanwhile great rivers of black lava poured irresistibly down the mountain sides, filling the streets and cutting off the exit of those who had taken refuge in cellars; while others, who were attempting to leave the city by the gates, were blinded by the drifting ashes and overcome by the sulphurous vapors. For three days this terrible infliction continued; and then, when the smoke dispersed, where once was a beautiful town was but an arid mass of ashes, pumice-stone and hardened mud.

Centuries went by. The rich volcanic soil became covered with a profusion of vegetation, and a new town sprung up over the buried city, only to be destroyed by earthquake four hundred years after the great eruption. Pompeii then existed only in tradition; and this located the lost city several miles from the uninhabited plain under which it was eventually discovered. In the middle of last century the finding of relics in the vicinity induced the government to undertake systematic excavations. An inscription was soon unearthed establishing the fact that the true Pompeii had undoubtedly been found; and since that time the work of uncovering the buildings has been slowly and carefully carried on.

Fortunately the material which chiefly covered the city was not lava, which would have set like stone after probably burning paintings and melting objects in metal, but a fine, light ash, which insinuated itself into the minutest crevices, and even through porous earthenware. The writer assisted in opening a large wine jar still bearing the seals placed over its mouth at the time of filling. The white ashes had replaced the wine, and made their way through pottery of close texture and now harder than stone. Generally, however, the presence of the ashes has proved a positive advantage, because, in opening a street, for example, they are easily dug out and removed; while by packing closely around perishable objects, they have formed perfect molds, retaining the form of the objects after the same have wholly decayed and disappeared. It is not frequently that articles are found at a height above four feet from the floor, as their weight naturally carries them downward through the soft mass of ashes. The digging is therefore rapidly prosecuted until the above uniform level is attained. Then shovels and picks are put aside, and the ashes are taken out by handfuls, each workman carefully crumbling the material to powder before rejecting it. As soon as the experienced eye of any worker recognizes the indications of a mold being formed in the ashes, labor near that point is stopped, and tamping irons are cautiously inserted to make two or three vents in the cavity. Then liquid plaster is poured in, and after being left sufficiently long to harden, the ashes are taken away and the cast removed.

It is believed that of the inhabitants of Pompeii thousands perished. Many hand in hand groped their way through the streets, and so escaped to the open country. At the chief gate there stood a sentinel, who sternly kept his post through the thunders of that dreadful day. He died in harness. Planted in his sentry box, he covered his mouth with his tunic, and held on against the choking and sulphurous shower. But the ashes fell and fell, and finally filled the box, and buried the soldier alive, still grasping his weapon in one hand and veiling his mouth with the other. There, after ages of rest, he was found — a grisly skeleton clutching a rusty sword.

Sad discoveries were made in the street leading to that gate. There were two skeletons locked in close embrace, the teeth perfect, indicating youth in its prime: skeletons of a young man and maid. They had fallen together in their flight, and death had wedded them. There was a mother with her three children hand in hand, who tried vainly to outrun death. Perhaps the mother singly might have done it, but she could not leave her children. Plenty of food for sad thought is furnished in remembering that six hundred skeletons have been already exhumed! — many in such positions and circumstances as to suggest very touching episodes accompanying the final catastrophe. Of the family of Diomed, seventeen persons were stifled in a wine cellar well stocked with amphoræ of wine, some of which bore the date of the vintage. The fugitives in their agony of fear stood all huddled in a corner. One swooning girl fell forward on to the bed of ashes that had drifted in. She left the impress of her bosom in the drift like a seal in softened wax.

An interesting little circumstance is connected with one of these houses. The skeleton of a dove was found in a niche overlooking the garden. Like the sentinel, she had kept to her post, sat on her nest through all the storm, and from beneath her was taken the egg she could not leave.

The shops and taverns which have been exhumed are very interesting as illustrating the domestic life of the people. Eighteen hundred years ago, a baker, having placed his loaves in the oven, had closed the iron door, when he had to fly for his life. A few years since the batch was drawn. The loaves are jet black and of stony hardness; but the marks of the baker's fingers show plainly on them. In an eating-house were found raisins, olives, onions, figs, fish cooked in oil, and other articles of food, some retaining their natural appearance and all plainly recognizable. It is a curious fact that a precisely similar mode of cookery prevails in the modern Italian villages to that indicated by the utensils and prepared food found in Pompeii; and in some instances vessels have been found which might at the present day be put to their original use, as they differ little from those now employed. In one eating-house, for instance, is a dresser of brick work in which are large metal and earthenware vessels for soup, with furnaces to keep it warm and ladles to distribute it, precisely as are used in modern restaurants. Amphoræ of wine are marked with the year of the vintage, the characteristic quality, and the name of the wine merchant from whom they were purchased. Taverns are indicated by checkers on the door-post, or by a sign painted on the wall. The streets are paved with solid blocks of stone worn in deep ruts by chariot wheels; and at one drinking fountain, where slaves stooped and drank from the flowing spout, on the edge of the trough is a spot worn smooth by the pressure of the many hands that rested against it.

The dwellings for the most part are small and low, few exceeding two stories. They have little ornamentation externally, and are well adapted to a people accustomed to pass most of the day in the open air. The upper stories being of wood, with flat roofs, were speedily consumed; but as those portions of the house were generally used as store-rooms or apartments for servants, their loss is of little consequence. The ground apartments have escaped serious injury; and on their walls some of the frescoes appear as brilliant as if recently painted.

The walls of the city, which have been traced throughout their full extent, indicate that an irregular, oval area of about two miles in circumference was occupied. It has generally been supposed that the population was from 20,000 to 50,000, but according to Signor Fiorelli, the general superintendent of the excavations, Pompeii had not more than 12,000 inhabitants at the time of the eruption. Eight gates have been discovered, and the roads outside of them were lined on each side with tombs of considerable size and architectural pretension. The Street of Tombs, before the gateway of Herculaneum, was probably the principal burying-place of the city; but the sepulchral monuments adorning it gave evidence of the refined taste and great wealth of prominent Pompeiians. The streets, which for the most part run in regular lines, are with some exceptions barely wide enough to admit a single vehicle. The widest does not exceed thirty feet in breadth, and few exceed twenty-two feet. Five of the main streets have been partially or wholly traced; and with these a regular system of minor streets appear to have been connected. These thoroughfares, with a single exception, terminate in or traverse the western quarter of the city, which is the only part yet completely explored. The public buildings were profusely decorated structures, and included temples of Jupiter, Mercury and Venus, beside two theaters. The thermæ, or public baths, were elegantly adorned.

The most important paintings and objects of art discovered by excavation have been deposited in the National Museum, at Naples. Until recently, the excavations have proceeded slowly; but at present the Italian Government is liberally assisting the work. The space now laid bare measures about 670,000 square feet, or one-third of the whole area occupied by the city. Signor Fiorelli calculates that, making the excavations on an average twenty-five feet deep, and employing eighty-one laborers daily, the city will be unearthed in 1947.

UNDER THE ICE.

THERE was no braver guide, or more skillful hunter, that ever sat foot upon the Matterhorn, or crawled over the dangerous glaciers of Monte Rosa, than Ulric Peterson. He was a man of immense strength and great daring; and had often tracked the wilderness of snow when those who followed the same calling willingly remained in their cottages in the well-protected villages. He laughed at his companions when they talked of danger; and made light of the fears of his good wife, when she trembled at the howling of the fierce winds, or the avalanche of snow, that now and then swept down with irresistible force upon the little chalets. With well spiked shoes, a stout alpenstock, confidence in himself, and a firm and fervent trust in God, he avowed that a man was as safe upon the topmost cliffs of the cloud-pierced Matterhorn, as in the brook-threaded valley of Tourmanches. But the timid heart of womanhood could not look upon the matter in the same light, although her trust in the good Lord was equally strong; and so, when she saw him take down his trusty rifle, powder-horn, and heavily shod iron staff, one morning, she clung to him, and begged that he would not go upon the mountains. "There is every sign of a storm," she said. "You know how terrible they are. We have food enough in the cottage. Do stay at home with the little ones."

"That would I, wife," was the reply, "if I had not seen an ibex as I was coming home yesterday evening. He was a stout old fellow, with huge horns; and I fancied he was almost laughing at me as I crept around the cliff upon which he was standing."

"But, Ulric, think of the storm that is certainly coming!"

"I have been in many a one, and care nothing for them. I love the free whistling of the wind upon the mountain tops, and the whirling of the feathery snow. So, good wife, get me something to eat. I must be off before the day dawns."

With a heavy sigh, the woman did as he had requested, and with his fond kiss still lingering upon her lips, she saw him climb the mountain side until a turn in the path hid him from her view. Then she sunk upon her knees by the bedside of her still slumbering children, and committed him into the keeping of that God who had thus far preserved him in the midst of every danger. Meantime, Ulric hastened onward with a light foot. It was still dark in the valley; but far above him he could see the white peak glittering in the dim light of the morning, and the fast paling stars. Higher and higher he climbed, and soon the sun arose, shedding its rays of rosy gold upon the icy piles and making them flash as if builded of myriad diamonds. To a stranger it would have been a dazzling sight; to the brave hunter it has lost something of its charm by familiarity, and he pressed onward and upward. The road grew rough and difficult. He was obliged to pick his way, to clamber up steep crags; but at last he reached the edge of a large glacier. He sat down and rested for a little time, satisfied his hunger, examined his shoes and the point of his alpenstock, and again set bravely forth, leaping the yawning chasms, and guarding against the treacherous cracks.

A wall of polished ice arose before him, and he knew that he would have to scale it before he could get within shot of the coveted game. With great difficulty it was accomplished; and finding the tracks of the ibex, he followed them, until suddenly turning a ragged point, he found himself within easy shot, and in an instant the report of his rifle had awakened the echoes of the mountains. With the "thud" of the bullet the beast sprang forward, but its tail was dropped, its head hanging heavily down, its gait slow and step uncertain. He knew that the whizzing lead had reached its mark; that the animal would soon die; and he paused to reload his rifle before he followed him. "I will surprise my good wife," he thought, "by returning sooner than she expected, and I will have a hearty laugh at the cowards who dared not venture from their snug cottages for fear of a storm."

With a smile upon his lips, he hastened to where the ibex was lying, and raised it in his arms. Then, with a cry of horror, he felt his footing give way — and hunter and game were swallowed up in a crevasse of almost unfathomable depth. The thin covering of ice had been sufficiently strong to bear the weight of the beast; but that of Ulric added, had shivered it as if it had been an egg-shell.

Down, down. Hunter and ibex, through the débris of snow and ice, lying there for a thousand years. He fancied that the bottom would never be reached. The most profound darkness enveloped him; his hands could clutch nothing but dampness — but chilling flakes.

Fortunately the carcass of the beast was beneath him. Yet, for all that safeguard, he lay for a long time insensible. When consciousness returned, another day had dawned, and its golden glories had found their way even to the bottom of the yawning grave in which he was lying. He thought upon the utter helplessness of his situation — that he must perish from cold and hunger — of the lingering tortures he would be forced to endure, before death came to put an end to his misery, and every nerve in his body quivered with horror. He looked around to see if there was not some possible chance of escape. On either side smooth ice walls arose, emitting a bluish steel glitter. He felt that he was buried alive! "O God! Why was I not instantly killed!" he exclaimed, in the agony of despair, and then, as better thoughts swayed him, he thanked the Almighty, with whom nothing is impossible, for his safety thus far, and prayed to Him for guidance and deliverance.

His next thought was of his gun. When it was found that he did not return, his neighbors would certainly search for him, and by firing the gun he could attract their attention. Vain hope! Search as he would he could find nothing of it. Even if he had discovered it, it would have been useless, for his powder-horn was gone as well. Over and over he turned the snow — down deep he dug into it, until his hands burned like fire, and great drops of perspiration rolled from his forehead — until his arms grew stiff and sore, and he was forced to give up the useless labor from sheer exhaustion. With his back against the frozen prison walls, he looked aloft, and saw the great vulture sailing upon its immense and tireless wings around the mouth of the chasm, and the strong man shuddered, as he shook his fist defiantly and murmured with his hoarse voice: "Your time has not come yet!" He thought also of his happy home, and of his dear wife and children, and then, naturally, for he was faint and hungry, he thought of the food his wife had prepared for him. Having eaten of the bread and goats-milk-cheese, and drank of the little bottle of wine (which, strange to say, had remained unbroken), he reasoned that it would be cowardly to lie down and die without an effort, and he remembered the goodness of God, and once more fervently implored His help. Then a bold idea came to him. Why might he not cut his way through the solid ice! He had a hatchet, such as his class never travel without. Ah! but he was forgetful that the walls might be hundreds of feet thick, that they were of excessive hardness, and would soon render blunt both hatchet and knife. The bright hope that had been born within him was darkened by no such shadow. For the time being he knew that he was safe, he was accustomed to the cold, was warmly clad, could use the skin of the ibex in case of need, and its flesh would drive away the wolves of starvation for many a day. A brief rest and he began the task, and toiled faithfully until darkness forced him to stop. A night of uneasy rest, a breakfast of the raw flesh of the ibex, and he resumed his labors. Another day of toil, and he again stretched himself upon the skin of the beast, wrapping it around him as much as was possible, and slept long and heavily, although there had been a sudden fall in the temperature, and it was now excessively cold.

For four days he toiled thus, his only food the raw and frozen flesh of the ibex; for four nights he slept within the hole he had cut away in the thick ice walls, closing up the entrance, and thus obtaining partial shelter from the chilling blasts, and once he heard the firing of guns, and his heart beat wildly within him. He dropped his dulled hatchet, crawled to the center of the chasm, and shouted with all his remaining strength — shouted until his strained voice was reduced to the very ghost of a hoarse whisper. He knew that his friends were in search of him; imagined that he could hear his name called; could do nothing to attract their attention; and, as the firing grew fainter and farther and farther away, he flung himself down, weeping and wringing his hands. The last plank to which he had clung had been shivered. His neighbors and friends had come and gone. They would never search that part of the mountain again. None would ever know of his fate. He was buried in an icy tomb, until the last trump should sound and hot flashes of flame dissolve the frost-work around him.

With his mind trembling upon the verge of madness, overpowered by sorrow, crushed by bitter agony, he fell back insensible, and lay for a long time upon the cold, damp snow, that soon must be his winding-sheet. The black vulture flapped its wings above him, and he knew nothing of it. But after some hours, the hunter's consciousness returned, though he was far too much crushed, in body and soul, to resume his labors. He crept into the little cavern he had excavated (would it not be to him a tomb?) and gave passionate vent to his grief. For many weary hours nothing passed his lips, and with aching head and fevered brain, with trembling limbs and convulsive sobs, he prayed for deliverance, if by no other hand, at least the skeleton one of death.

It was rayless, sunless, starless, darkness in the ice cavern, when the springs of his life again became capable of action; he was ravenously hungry, and arose to satisfy his hunger with a portion of the ibex he had left remaining outside in the chasm. He felt around, but could discover no outlet. Had he been frozen in — shut out from God's blessed sunshine forever? Nothing but smooth ice met his burning and blistered fingers. Then, after an hour's search, he found a soft spot, and instantly solved the mystery; he knew there must have been a heavy fall of snow in the night, and that it had drifted into and blocked up the opening; and with the strength of despair he soon dug through. It was still snowing heavily; the flakes fell like great feathers around; and he drew the remnant of the carcass of the ibex into the cave, and made another rude meal. And thus refreshed a new hope was born within him; and again the ice walls resounded with the blows of his little hatchet. But it was slow work, and much of the time was taken up in clearing the chips from the little grotto.

A week passed — a week of the most severe toil and terrible anxiety — and yet he was not disheartened. His trust in God had returned; and love for his wife and dependent children kept alive his often sinking heart. He was yet in hopes of reaching the upper air, of seeing his dear ones again. But even as he was thinking thus, with something of his old-time cheerfulness, a new anxiety took possession of and nearly overpowered him. The carcass of the ibex, that had been the innocent cause of all his troubles, was picked almost to the bones.

With dire starvation staring him in the face, he bowed his head and wept like a child. Starvation, that is dreadful, even in thought! Starvation, that has in it more of horror than a thousand other deaths! He could almost see it silently approaching, and for a time despair alone had possession of him. Then his trust in the Supreme Being returned, and he committed himself unto His holy keeping. "Heavenly Father!" he murmured from between his parched and blackened lips, "it is Thy hand that has sustained me so far — has saved me from all danger. Thou givest food to the young ravens, and markest even the fall of the tiny sparrow. None but Thou can hear or help. Hear my prayer? Save me, O God! Save me!"

Something of sweet consolation came with the utterance of the words, and he lay down to sleep more tranquilly than he had done for many previous nights. Yet it was only to be awakened by a new fear. It needed no seer to tell him that the fohn, or hot south wind, was sweeping over the glaciers and snow-fields of the high Alps; and that the rain was falling in torrents, and the enormous blocks of ice melting as by the touch of fire. The cavern he had dug with infinite labor was almost breast-deep with water, and it was rushing in with all the swiftness of a mountain torrent. Instantly he was wet to the skin, and stood almost paralyzed with terror. Then he breasted his way out into the chasm, but it was only to return again as quickly as possible. Never cataract raged more fiercely than the surging water there. Cutting little niches in the ice-wall, he climbed beyond the reach of the water, and tremblingly awaited his fate. The waves rose rapidly higher and higher. He had climbed until his head rested against the top of the little cave — he could go no further. And yet the waves rolled upward around him. They reached his waist — surged higher to his breast — crept to his throat, and, despite all his efforts, began to trickle into his mouth. In another moment he would be strangled by them; his hold would be torn away, and his body dashed hither and thither against the sharp points of the ice. "O God! Save me! Save me!" burst from him in the terrible agony of the instant, the moment of time that lay between him and death.

A noise like thunder — a shivering crash — resounded through the chasm. It appeared as if the very foundations of the world were tottering beneath him. Now, indeed, he felt that his end had come. No! Terror was instantly changed to rapture. The water rushed out of the cavern with the most amazing velocity; he could descend and stand upon the bottom without fear. How this had been accomplished, he was forced to wait until the morning light to determine; and, with the first beams, he saw a great fissure had been opened, through which the imprisoned waters had found their way to the valley below. This unlooked for preservation again inspired him with confidence — rendered more firm his trust in God. Through that tunnel he saw a way to freedom. It was small, to be sure, but he could enlarge it, and he worked diligently, until his strength utterly failed. The ibex was entirely devoured. He had split the bones and sucked out the marrow; had gnawed them over and over again, to appease his hunger. For two days he had not tasted a morsel of food. The hatchet slipped from his hand when he endeavored to strike a blow, and he was forced to abandon the undertaking. There was nothing left him now but to die.

Another day passed, and no help came. He lay crouched in a corner wishing that the end would come, and that swiftly. His eyes were already filmed and his heart beat faintly. Then a strange noise aroused him. He looked aloft and saw a chamois vainly striving to defend itself from the attack of two old vultures, that were striking at it with wing and beak. It was an unequal contest, and at length the animal, driven to desperation, attempted to leap the broad chasm. The effort was a noble one, but it failed of success. The chamois missed its footing and fell, bruised and helpless, at the very feet of the starving man. In an instant his knife was plunged into its throat, and the warm blood was drained by his eager lips. This gave him new life, and he renewed his labor. It was almost an herculean task. More than once he fell fainting beside it. But hope was very strong within him. Still he would have utterly failed had not heaven assisted him.

Again, the fohn was busy at its work of destruction; again, the windows of heaven were opened; and the "rains descended, and the floods came," and accomplished more in a single night than his hands could have done in months. With the morning light, he crawled through the now large tunnel; but, when he reached the out end, found, to his horror, that he was on the top of a mighty precipice. His blood boiled; his brain seemed on fire; his heart beat as if it would break through ribs and flesh. He was, if possible, more desperately imprisoned than before. How was he to get down? Through his bewildered mind suddenly flashed the thought of the skins of the ibex and the chamois, and he was not long in making a rope of them. He then cut a deep hole in the ice, drove down his alpenstock, fastened one end to it, and swinging himself off, reached the bottom in safety.

With a cry of joy and a prayer of thankfulness, he hastened along the well known path; and when the bell of the little chapel that reared its gilded cross in the Matter Valley was tolling for the evening prayers, he staggered like a drunken man into the very midst of the astonished worshipers, even as the voice of the good priest was repeating, "God is everywhere with me; and everywhere, even in the most threatening dangers, his voice speaks to me in tones of comfort, and says, 'Call upon me in the day of trouble, and I will deliver thee, and thou shalt glorify me!'"—staggering toward the altar to kneel beside it, he fell fainting into the arms of his wife, who again nursed him to health, strength and manhood.

THE GREAT MOUNTAINS.

THE mountains could not stand for a day unless they were formed of materials altogether different from those which constitute the lower hills and the surfaces of the valleys. A harder substance had to be prepared for every mountain chain, yet not so hard but that it might be capable of crumbling down into earth, fit to nourish the Alpine forest and the Alpine flower; not so hard but that, in the midst of the utmost majesty of its enthroned strength, there should be seen on it the seal of death, and the writing of the same sentence that had gone forth against the human frame, "Dust thou art, and unto dust thou shalt return." And with this perishable substance the most majestic forms were to be framed that were consistent with the safety of man; and the peak was to be lifted, and the cliff rent, as high and as steeply as possible, in order yet to permit the shepherd to feed his flocks upon the slope, and the cottage to nestle beneath their shadow.

And observe, two distinct ends were to be accomplished in doing this. It was, indeed, absolutely necessary that such eminences should be created, in order to fit the earth in any wise for human habitation; for without mountains the air could not be purified, nor the flowing of the rivers sustained, and the earth must have become for the most part desert plain or stagnant marsh. But the feeding of the rivers, and the purifying of the winds, are the least of the services appointed to the hills. To fill the thirst of the human heart for the beauty of God's working — to startle its lethargy with the deep and pure agitation of astonishment — are their higher missions. They are as a great and noble architecture; first, giving shelter, comfort and rest; and covered also with mighty sculpture and painted legend. It is impossible to examine in their connected system the features of even the most ordinary mountain scenery, without concluding that it has been prepared in order to unite, as far as possible, and in the closest compass, every means of delighting and sanctifying the heart of man. "As far as *possible*," that is, as far as is consistent with the fulfillment of the sentence of condemnation on the whole earth. Death

WETTERHORN MOUNTAIN, SWITZERLAND.

must be upon the hills, and the cruelty of the tempest smite them, and the brier and thorn spring up upon them; but they so smite as to bring their rocks into the fairest forms, and so spring as to make the very desert blossom as the rose. Inferior hills ordinarily interrupt, in some degree, the richness of the valleys at their feet; the gray downs of southern England, and treeless coteaux of central France, and gray swells of Scottish moor, whatever peculiar charm they may possess in themselves, are at least destitute of those which belong to the woods and fields of the lowlands. But the great mountains *lift* the lowlands *on their sides.* Let the reader imagine, first, the appearance of the most varied plain of some richly cultivated country; let him imagine it dark with graceful woods, and soft with deepest pastures; let him fill the space of it, to the utmost horizon, with innumerable and changeful incidents of scenery and life; leading pleasant streamlets through its meadows, strewing clusters of cottages beside their banks, tracing sweet footpaths through its avenues, and animating its fields with happy flocks, and slow wandering spots of cattle; and when he has wearied himself with endless imagining, and left no space without some loveliness of its own, let him conceive all this great plain, with its infinite treasures of natural beauty and happy human life, gathered up in God's hand from one end of the horizon to the other, like a woven garment, and shaken into deep falling folds, as the robes droop from a king's shoulders; all its bright rivers leaping into cataracts along the hollows of its fall, and all its forests rearing themselves aslant against its slopes, as a rider rears himself back when his horse plunges; and all its villages nestling themselves into the new windings of its glens; and all its pastures thrown into steep waves of greensward, dashed with dew along the edges of their folds, and sweeping down into endless slopes, with a cloud here and there lying quietly, half on the grass, half in the air; and he will have as yet, in all this lifted world, only the foundation of one of the great Alps.

They seem to have been built for the human race, as at once their schools and cathedrals; full of treasures of illuminated manuscript for the scholar, kindly in simple lessons to the worker, quiet in pale cloisters for the thinker, glorious in holiness for the worshipers. And of these great cathedrals of the earth, with their gates of rock, pavements of cloud, choirs of stream and stone, altars of snow, and vaults of purple, traversed by the continual stars — of these, as we have seen, it was written, nor long ago, by one of the best of the poor human race for whom it was built, wondering in himself for whom their Creator *could* have made them, and thinking to have entirely discerned the divine intent in them — "They are inhabited by the beasts."

Mountains are, to the rest of the body of the earth, what violent muscular action is to the body of man. The muscles and tendons of its anatomy, are, in the mountains, brought out with fierce and convulsive energy, full of expression, passion, and strength; the plains and the lower hills are the repose and the effortless motion of the frame, when its muscles lie dormant and concealed beneath the lines of its beauty, yet ruling those lines in their every undulation. This, then, is the first grand principle of the truth of the earth. The spirit of the hills is action; that of the lowlands, repose; and between these there is to be found every variety of motion and of rest; from the inactive plain sleeping like the firmament, with cities for stars, to the fiery peaks, which, with heaving bosoms and exulting limbs, with the clouds drifting like hair from their bright foreheads, lift up their Titan hands to heaven, saying, "I live forever!"

Surrounded by sublimity from their birth, ever drinking in the inspiration of grandeur, and reminded on every hand of the weakness of man and of the omnipotence of the Creator, is it any wonder that the Swiss should be as noble, as devout and as generous as they are? Switzerland is nearly all mountains and lakes; and chalets, as cottages are called, are built in narrow passes two or three thousand feet above the sea.

The mountain tops are ever covered with snow. The solid rocks are often jagged and pinnacled. The unceasing action of cold and heat — the frost of night and the sun's rays by day — broke piece after piece away until they became irregular. The steep sides and the abrupt descents show where the terrible destructive avalanches come from. The snow collects — rather it falls — upon the summit, catching in the crevices and lodging on the projections. The sun's heat melts the snow until its weight loosens its hold upon the peak, or breaks the restraining rocks, and a tremendous mass of snow and stone goes tumbling and crashing down until it is arrested by broader projections or plunged into the valley below.

It is a grand sight to see an avalanche, and at noontime any day they are frequent. A faint rumbling noise is heard in the valley, and looking up one sees a white cataract of snow pouring from some dizzy height, bounding over one, two or more jutting rocks, and finally lodging in some abyss, and perhaps it tears its way down to the mountain's base with the speed of the wind, prostrating trees, sweeping a broad path, crushing in dwellings, and loosening huge bowlders which follow in the wake and make the destruction more complete and terrible.

High on the mountain side an avalanche which, unchecked, could bury in ruins a whole village, looks but a narrow band of white, and its awful proportions and power are not appreciated until its might is demonstrated in the valley.

Snow melted by the sun, and pressed beneath the weight of the latter accessions, forms the glaciers,— those immense seas of ice — carrying upon their frozen billows great masses of rock wrenched from bordering cliffs. The tens of thousands of tons of snow upon the mountain tops, aided alternately by frost and warmth, thrust, at times, the terminal, or end of the glacier, far down into the green and fertile valley, while from an icy cavern flows a muddy stream, which is a mere brook or river according to the size of the glacier or the time of day. The smaller glaciers, which rest upon the mountain heights, pour forth clear streams of delightfully refreshing water.

The cities and villages of Switzerland are located in valleys and by the side of some rivulet fed by mountain streams, or on the shore of some beautiful lake formed by the rivulets, and in these places the inhabitants earn a livelihood by making the watches and jewelry so celebrated the world over, and by manufacturing silks, cloths, laces, etc. But the sturdy Swiss of history, they whose bravery has so often saved their own and even other countries from invaders, they who to-day maintain the distinct characteristics of their noble ancestors and caused their country to shine as a guiding light upon a mountain top to the other nations of the Old World —

they the intelligent, upright, conscientious, just peasants, belong not to the towns, but dwell in such homes as have been pictured among the wild, grand mountains and breathe pure invigorating air, removed from evil associations and influences, their eyes, steps and minds directed upward.

LET US HAVE MEN.

MEN are what we want — not kings, nobles, presidents, governors, office-holders, nor gentlemen merely — not the puny, purse-proud specimens of humanity that strut the stage of life as if all the world belonged to them — but *men* in every sense that the term implies. We want firm and reliable supports at the head of our country — men in whom our people can repose entire confidence without fear that their national honor will be compromised, or their government sink into the quagmire of disorder and confusion. A bad code of laws is worse than no laws at all, for under the cloak of legality more crimes will be perpetrated than when one has nothing but his own sense of honor to direct his actions. If laws are not to deter men from crime, it is better not to establish a system that will aid them in evil-doing. The naturally bad will presume upon legal prerogatives just so far as they are permitted.

In the common avocations of life, in our schools, in mechanical, mercantile, and agricultural pursuits, we want men whose integrity of purpose is so strongly stamped upon their actions that one cannot mistake them. Truth and integrity we hold to be the prime essence of the true man; nothing so nearly allies him to his Creator. Let us have men whose souls point them to something beyond mere mercenary attainments, with wills to do and dare the most perilous enterprise for the accomplishment of a noble purpose, and hearts tempered with the "milk of human kindness" that never ceases to flow out to their fellow-beings in penury and affliction. It is such as these that have swayed the world ever since the beginning of time. Their influence is mightier than a scepter. They win their way direct to the confidence of the masses, who become their willing subjects. Tyrants may govern the physical man, but they can never control the other elements of his nature, for "he who overcomes by force hath overcome but half his foe." "Ah, my countrymen! it is now that I tremble for you; Edward only arms our citizens, but Philippa conquers hearts!" exclaimed St. Pierre, when that noble queen revoked an order of her husband for the execution of the venerable patriot and his fellow-hostages.

The human race seems to have been much altered since the Creator first made man in his own image. When we look upon a portion of the present generation, and see instead of the man that was originally created, with fair form and mind, so many low, groveling creatures, with only human shapes, we can but wonder with whose image they are stamped. They seem to be brutes of beastly habits and instincts, who do not deserve the name they bear.

If your lot is the most abject poverty, your home amid the wilds of Africa, or the jungles of India, and you have never had the advantages of an education or christian religion, you can at least fulfill the purpose which your Master designed you — *be a man.* It is the soul that makes you what you are. All else is mere outward adornment — the putting on of apparel.

Good-for-nothing people are unfortunately very numerous. Even when they are children they show signs of their nothingness. They like play but they detest work and study. Thus they grow up, knowing nothing and learning nothing, unless it be something that will do them no good. When they become men and women they hardly know how to get a living honestly, and it is quite likely that they will try to get one dishonestly. They constantly complain that they cannot get along, and they wonder why it is. There is really nothing strange about it. They never tried to learn when they were young; they have always shirked work; they are lazy, and now find it easier to beg or steal than to get an honest living by hard work.

A man who does nothing is a mere cipher. He does not fulfill the obligations for which he was sent into the world, and when he dies, he has not finished the work that was given him to do. He is a mere blank in creation. Some are born with riches and honors upon their heads. But does it follow that they have nothing to do in their career through life? There are certain duties for every one to perform. Be something. Don't live a hermit and die unregretted.

PENALTY OF GREATNESS.

SOME are born great and some have greatness thrust upon them; but however acquired, greatness is subject to heavy prices and penalties. One of the heaviest, and one which is universally attached to greatness, is the absolute surrender and sacrifice to privacy. All the belongings of a person occupying a prominent position are made public property. His home and furnishings, his garden and stables, are laid open to the gaze of the world by Jenkins. The personal appearance of his wife and children, their wardrobes, habits, employments, accomplishments and manner of living and entertaining, are minutely described by the same indomitable scribbler. All his idiosyncrasies, foibles, weaknesses and antipathies are faithfully reported. Dexterous interviewers extract his thoughts and opinions, and parade them in the press. His parlor, dining-room and bed-room are invaded, in and out of season, by Paul Prys, who make haste to relate all that their eyes have seen. He cannot visit his grandmother or purchase a rattle for his youngest born without some "enterprising correspondent" making note of it.

Even death brings him no privacy. His favorite article of food, his hours of sleep, and the manner in which he put on his clothes, are described and preserved in weighty volumes for the curiosity of posterity.

His ashes are not safe from a thorough raking over. Witness the deluge of "Byron scandal" a few years ago. In politics, not merely the great, but also the aspirants for greatness must pay this penalty of exposure to public gaze. It is more burdensome here than elsewhere, because less regard is had for truth and more malignity is manifested.

The nomination of a man to public office is the signal for venomous assault. His private affairs are rudely pried into, and he is credited with much he never possessed or dreamed of. It matters little that his record is clear, his honor, integrity and purity of life irreproachable. If nothing evil can be said with truth it will be said without. Anything to beat the opposition candidate is the motto of political campaigns, and foul epithets and slander are the stock in trade. His enemies drag the family skeleton from his closet and parade it with added hideousness. They investigate his whole private life and business, and misrepresent his deeds, distort his motives, and pervert his language. They search his pedigree, and saddle him with all the sins of his ancestors and relatives. They ridicule his peculiarities of manner and dress as if they were matters of great moment.

Probably another century of civilization will be necessary before public sentiment will hold the privacy of prominent persons sacred to some degree, and also regard ridicule, epithets and slander as illegitimate and disgraceful in politics. Until then, those who rise above mediocrity or who seek to serve their country, must suffer this undeserved penalty

FERNANDO DE SOTO.

FERNANDO DE SOTO was born at Xeres de los Caballeros, in Estremadura, a province in Spain, in the year 1500. He came of a noble but reduced family, and only through the personal friendship of Davilla — afterward governor of Darien — was he enabled to spend his earlier years in a university, where he distinguished himself by his scholarly habits and acquirements. When he was nineteen years of age he accompanied Davilla to America. He remained in this man's service for several years; although he openly disapproved the governor's oppressive administration. He withdrew from his service in 1528, and went to explore the coast of Guatemala and Yucatan for seven hundred miles, in search of the strait which was supposed to connect the two oceans. By special request of Pizarro, in 1532, De Soto joined him in his enterprise for conquering Peru, with a promise of being appointed second in command. In 1533 he was sent, with fifty horses and a few targeteers, to explore the highlands of Peru. Here he encountered and defeated more than a thousand Indians, penetrated through a pass in the mountains, and discovered the great national road leading to the Peruvian capital. Pizarro selected him to visit the Inca as ambassador. After Pizarro had captured the Inca by treachery, De Soto in vain entreated him to let the monarch go free. De Soto distinguished himself in all those engagements that completed the conquest of Peru, and was the hero of the battle in which was captured the metropolis, Cuzco. Soon after he returned to Spain with a fortune of $500,000, met a flattering reception from the emperor, and married the daughter of Davilla. In 1536, there being a belief that Florida was a new El Dorado of undiscovered riches, De Soto proposed to the emperor, Charles V, to make a conquest of Florida at his own expense. Spanish and Portuguese cavaliers enrolled themselves among his followers.

With six hundred men, twenty officers and twenty-four ecclesiastics, he set sail from San Lucar in April, 1538. They stopped first at Cuba, and then at Havana, where they left the ladies attached to the expedition. They then crossed the Gulf of Mexico and anchored in Spiritu Santo (Tampa Bay), May, 1539. His route lay through a country made hostile by the violence of the Spanish invader, Narvaez, and De Soto was constantly deluded by Indians, who thought it best to send the unwelcome arrivals as far off as possible with fabulous reports of gold deposits in remote sections of the country.

In July, 1539, he sent back his ship to Havana. He discovered a Spaniard who served for an interpreter. That first winter was spent in the country of the Appalachians, east of Flint river. Directed to the north-east, in 1540, he reached the Ogechu, thence proceeding to the south, he reached the Coosa, and, in October, the village of Marilla, or Mobile, on the Alabama river. Then followed the fiercest battle ever fought between Europeans and North American Indians. The Spaniards lost something near a hundred men, and the Indians, it was reported, over two thousand. Ships meanwhile arrived at Ochus (Pensacola), but De Soto sent them no word concerning his fortunes.

The second winter he spent with the Chickasaws;

DE SOTO IN THE
WILDERNESS.

but when, in the spring, he attempted to make them carry his baggage, they attacked and burned his camp and the village. Forty Spaniards perished in the flames by reason of the night assault.

Soon after they began their march to the northwest a pestilential fever broke out among them, carrying off about a score of men. After a seven-days toilsome march through forests and marshes he reached the Mississippi. He spent a month in constructing barges to transport his army across the river. He then went north to Pacoha, where he remained for about a month to rest. He then marched northwest until he reached the highlands of White river, in the eastern portion of what is now the Indian Territories. He then proceeded south by the hot springs of Arkansas, which his companions insisted was the fabled fountain of youth, and made his third winter station at Antiamque, on the Washita river.

In March and April he moved south again, till he came to the Mississippi, and while attempting to descend to that river through the bayous and marshes he was seized with malignant fever and died.

His soldiers pronounced his eulogy; the priests chanted the first requiem ever heard echoing over that turbid tide, and in the midnight stillness, with his mantle for a winding-sheet, he slipped from the hands of his friends, and the rolling waves parted to engulf him. His life, his dreams of gold and his explorations were alike finished by the Mississippi's tide.

It would take a large volume to contain a record of his personal adventures and deeds of valor, as with prancing steeds and glistening armor, lance and shield, the irresistible cavalcade swept up through the wildernesses of Florida, Georgia and Alabama, and over the prairies of the Great West. The imposing cavalcade, with its splendid equipments, must have been an astonishing spectacle to the aborigines of the wilderness country. And, after the bloody conflicts, De Soto would have preferred his exploration to have been peaceable. When before him rolled sublimely the mighty flood of the majestic river, it was hard to die; but his name and his memory will not be lost from the heart of mankind while heroic deeds and dauntless daring have power to quicken the pulses with respect and admiration for the heroes of the world.

MICHAEL ANGELO BUONAROTTI.

ON the 6th of March, 1474, at the Castle Caprese, in Tuscany, was born the child who was afterward to become so renowned. Michael Angelo was noble by birth; his father was descended from the Counts of Canosa. Probably his wealth did not equal his patrician ancestry, for the proud nobleman sent his son to a grammar school at Florence. A public school is no unusual place for genius to develop itself, and here it was that Michael Angelo's soon shone forth. His facility in sketching — a talent always appreciated by schoolboys — made him popular among his young companions; they encouraged him, and their praises fostered the love of art in his bosom. This passion for drawing, however, was pursued in secret; for his father used all his efforts to discourage the boy, thinking, poor man! in his foolish pride, that it would disgrace the noble house of Canosa to produce an artist! He did not know that but for that great artist his ancient house would have been forgotten; and that now Michael Angelo is remembered for his genius, not for his nobility.

The first story of the boy's progress in art is told of him in his thirteenth year. He borrowed a picture from a friend, and copied it with such exactitude that it could hardly be distinguished from the original. A plan for a boyish deception came into his head: he confided the secret to one of his playfellows, and the two boys, with grave faces and many thanks, brought to the lender not his own picture, but Michael's copy. He, worthy soul, discovered not the cheat put upon him, and was restoring with perfect composure the fac-simile to the place of the original, when Michael's playfellow could resist his mirth no longer, and his irrepressible laughter revealed the jest. This story became known; his undoubted success encouraged the boy, and to his father's horror, he declared his first resolution to be an artist.

Most likely the incident of the borrowed picture influenced greatly Michael's future life; for in his fourteenth year we find him a pupil of Domenico Ghirlandajo, one of the best painters of the day, and who had studied under Giotto. Doubtless it was only after many struggles with his prejudiced father that Michael Angelo obtained this favor; but when gained, he profited by it in proportion to the difficulty with which he had secured it. When fifteen, he one day saw a figure on his master's easel, drawn in a style which he considered far from perfect. He made outlines of the incorrect portions of the drawing on its margin. These outlines were far superior to the picture itself; and his own consciousness of this, and a mean jealousy unworthy of the noble art he followed, made Ghirlandajo ever after strive to depress and injure the bold and talented boy who had dared thus openly to compete with his master.

Michael Angelo remained with Ghirlandajo only three years, during which time his improvement was owing to his own exertions, and not to his jealous master, who scarcely ever condescended to give him the least instruction. But perseverance often fully atones for the want of imparted knowledge; and so it was with Michael. Before he left the studio of Ghirlandajo, he had availed himself of permission given to the pupils of Ghirlandajo, by Lorenzo de Medici, to study in an academy which that wise and generous nobleman had instituted for the advancement of sculpture. Here Michael still continued to improve himself, and attracted the attention of Lorenzo the Magnificent by his beautiful drawings. The academy was held, like those early ones of ancient Athens, in a garden. This garden Lorenzo supplied with beautiful sculpture, chiefly ancient — for the moderns were very far from perfection until Da Vinci's time — and hither the good nobleman often walked among the objects of his taste and delight, supplied by his own munificent hand, or amused himself in watching the progress of the young artists whom he had invited to study in his grounds, with a kindly liberality which now, alas! exists only in name.

In this garden of art the young Michael Angelo one day saw a fellow-student modeling in clay — a branch of instruction then very uncommon. He felt a wish to do the same, and attempted an imitation, which Lorenzo, who happened to pass by, praised with such warmth that the young artist determined to try his skill in marble. He begged a piece of broken marble and a tool from some workmen who were employed in ornamenting the palace, and cheerfully and eagerly set to work. He chose as his model a mask of a "Laughing Faun," which was lying in the garden, much mutilated by time. But Michael remedied all these defects in his copy, and likewise added some improvements from his own powers of invention. The mask was nearly finished when, a few days after, Lorenzo again visited his garden.

"This is wonderful in a youth like you," cried the delighted nobleman. He examined the work, compared it with the original, and praised the several additions which Michael's genius had prompted.

"But," said this acute patron and lover of art, with a good-humored smile, "there is one thing I do not quite approve of, though it is but a slight fault in so good a work — you have restored all the old man's teeth; whereas, you know, a person of that age has generally some wanting."

The young man acquiesced in this sensible remark; and when Lorenzo had departed, he broke a tooth from the upper jaw of the mask, and drilled a hole in the gum, to show that it had decayed and fallen out in course of nature. On Lorenzo's next visit he was so delighted with the ingenious way in which Michael Angelo had followed up his patron's hint, that he gave the young artist an apartment in his house; made him a guest at his table; introduced him to the noble, wealthy and learned that thronged the palace of the greatest of the Medici; and, in short, adopted him as his own son.

When only seventeen, Michael Angelo executed for Lorenzo a basso-relievo in bronze; the subject was the "Battle of Centaurs." When very old, the great painter once came to see this work of his early youth, and was heard to say that he regretted that he had not entirely devoted himself to sculpture. His next work was a "Sleeping Cupid." The wise of that age thought it impossible for modern art to produce anything equal to the antique; and they were not far wrong, for Michael Angelo had not then arisen. So the dealer who purchased his Cupid had the cunning adroitness to stain it in imitation of the defacements of time, and bury it in a vineyard. He afterward pretended to discover it by accident, and sold it as an antique statue to Cardinal San Giorgio. The praise it obtained induced him to reveal the secret; the deceived public generously forgave the trick, and the artist was invited to Rome, where Pope Julius II commissioned him to erect a mausoleum. Michael's design was magnificent. When he showed it to the pope his holiness inquired the cost of such a splendid work. Michael answered that it would amount to a hundred thousand crowns; and the pope liberally gave him permission to expend twice that sum. The mausoleum was commenced; Pope Julius was so delighted with it that he had a covered way from his palace erected, that he might visit the artist at his work *incognito.* This was too great a favor not to excite the envy of a court. Ill words and unkind slanders were spoken of Michael. They reached the pope's ear, as it was intended, and he visited Buonarotti no more. Michael came to the Vatican, which had been at all times open to him, but it was not so now. A groom of the chamber stopped his entrance.

"Do you know to whom you speak?" asked the indignant painter.

"Perfectly well," said the man; "and I only do my duty in obeying the orders my master has given."

"Then tell the pope," replied Michael, "if he wants me, he may come and seek me elsewhere himself."

The insulted artist returned immediately to his house, ordering his servants to sell his furniture and follow him to Florence; and he left Rome that very night. Great was the pope's consternation. Couriers were immediately sent after Michael. But it was too late; he had already passed the boundary of the pope's jurisdiction, and force was of no avail. The couriers reached Florence, and delivered the pope's letter. Michael's answer was this: "I have been expelled from the antechamber of your holiness without meriting disgrace; therefore I have left Rome to preserve my reputation. I will not return, as your holiness commands. If I have been deemed worthless one day how can I be valued the next, except by a caprice alike discreditable to the one who shows it, and the one toward whom it is shown?"

Julius next wrote to the government of Florence, using these conciliatory words: "We know the humor of men like Michael Angelo. If he will return, we promise that none shall offend him or interfere with him, and he shall be reinstated in our apostolic grace." But Michael was inflexible. Again and again the pope wrote, and still this proud and high-spirited man refused to heed him. At last the chief-magistrate of Florence became alarmed. He sent for the artist and said, "You have treated the pope as the king of France himself would not have dared. We cannot bring him to war against the state on your account; therefore you must obey his will." The magistrate promised, also, if Michael feared for his personal safety, to send him as ambassador to Rome, in which case his person would be inviolable. At last Michael relented, and met the pope at Bologna. Julius glanced at him with displeasure, and did not for some time deign to speak. At last he said, "Instead of your coming to us, you seem to have expected that we should wait upon you."

Michael answered with a slight apology for his conduct, which, however, was so haughtily expressed, that a prelate, who had introduced him, thought it necessary to observe, "One must needs make allowance for such men, who are ignorant of everything except their art."

Wise and generous, too, was the pope's indignant reply to this speech. He turned to the prelate: "Foolish man! it is thou who hast vilified Michael Angelo; I have not. He is a man of genius, and thou an ignorant fellow. Depart from my sight this moment." And the contemner of art was forcibly driven from the room.

Michael Angelo's first commission after this was a statue of Pope Julius. It was the work of sixteen months, and worthy of Michael's genius. But its fame was short: in a popular riot this statue was thrown down, dragged through the streets and broken to pieces, in contempt of the pontiff whom it represented. The head alone was preserved by the Duke of Ferrara. After Michael had completed this statue he returned to Rome, and again set to work on the mausoleum. But Julius had changed his mind, and determined to build the Sistine Chapel to the memory of his uncle, Sixtus VI. This chapel Michael was to adorn with fresco paintings. His first attempt showed how universal were his powers of mind. He began to paint the ceiling; but the only scaffolding which the architect Bramante could contrive was suspended by ropes passed through holes in the roof. Michael Angelo asked how he was to paint a ceiling thus pierced with holes. Bramante could arrange no other plan; and Buonarotti invented some machinery so complete that the carpenter who made it, under his direction, realized a large fortune through Michael's generosity in allowing him to profit by the invention.

In twenty months the frescoes were completed, to the delighted wonder of his friends, and the envy of his enemies; all being the work of Michael Angelo's own hand, unassisted by any one. The pope had almost daily climbed to the top of the platform to watch the artist's progress; and by his persuasions Michael took down the scaffolding almost before the frescoes were finished. Crowds of the learned rushed to the building to see this wonderful work. But when the pope had gratified his impatience by viewing the painted ceiling from below, he began to wish for more ornaments on the drapery of some figures — more gilding and show. But Michael's reproof was not long wanting.

"I have painted," said he, "men who were poor, nor wished for riches — holy men, to whom gold was an object of contempt. I will add nothing."

The Sistine Chapel was publicly opened on All Saints Day, 1512. From that time to the present, Michael Angelo's frescoes have been acknowledged the most glorious triumph of art in any age. They consist of a series of colossal paintings descriptive of the progress of the christian religion, from the creation of the world until the last judgment of all men. To particularize them is impossible; and their praise has been a universal theme. Most of them are painted on the arched ceiling; and it is said that many figures were executed by the artist lying on his back on a heap of cushions; this being the only position in which he could reach them.

Three months after the completion of the Sistine Chapel, Pope Julius died. Leo X, who succeeded him, was by no means a warm friend to Michael Angelo. But his fame was now too well established to suffer from this lack of favor. He was now growing old; but his energies and talents were unwearied. Beside that of the Sistine, another chapel was erected called the Paoline. For this he painted two pictures — the "Conversion of St. Paul" and the "Crucifixion of St. Peter." At the age of seventy-two he was nominated architect of St. Peter's. This magnificent building, the grandest temple in christendom, was the design and erection of Michael Angelo. It was the work of many years and many struggles. The artist had to contend with the poverty and illiberality of his patrons; and once they endeavored to displace him. He had, in their opinions, not given light enough to the church in one portion of it.

"Three more windows will be placed there," said Michael Angelo.

"You never told us of that before," replied a cardinal.

"Nor will I be accountable to you for declaring all that I do, or intend to do," cried the high-spirited painter. "It is yours to provide money and keep off thieves: to build St. Peter's is mine!"

This independent speech won him the favor of the then pope, Julius III. From this time he placed unlimited confidence and regard in the artist, often saying that should Michael Angelo die before himself, his body should be embalmed, and kept in the palace, that his mortal form should endure as long as his works. But Julius died in 1555; and his successor, Paul IV, insulted the painter by wishing to *reform* the "Last Judgment" in the Sistine. Michael sent this message in answer: "If his holiness will undertake to reform mankind, I will engage that my picture shall reform itself."

This pope plunged Rome into war and bloodshed. Michael Angelo, then eighty-two years of age, took refuge in a monastery until these perilous times were over. It was with regret that he left this quiet abode to enter again on the turmoil of the world. He lived until the age of eighty-nine, and then died peaceably and calmly, uttering his last will in these words: "My soul I resign to God, my body to the earth, my worldly goods to my next of kin."

Michael Angelo's countenance was like his mind — full of noble grandeur. Straight Greek features, a high and rather projecting forehead, with clustering hair and beard, gave his portrait a character of sublimity which is like his works. These works were the grandest in conception and execution that mortal man could do — not beautiful, but sublime. It is often a reproach to a great man that his life is far inferior to his works; but Michael Angelo was in every way a noble and good man, not winning, but austere, in his virtue and simplicity of character, at an age when the contrary was most in fashion. He was never married, and used to say that his works were his children, who must bear his name to posterity. He lived in study and seclusion, never ceasing to seek after knowledge throughout his long life. In his old age, he was found one day by Cardinal Sarnite walking alone in the ruins of the Coliseum. The cardinal expressed surprise. "I go yet to school," said Michael, "that I may continue to learn."

This great artist's soul was full of high principle; he scorned everything mean and dishonorable. His disposition was generous, and many a kindness did he show to inferior artists and others who needed it. Sometimes his gifts were munificent. To his old servant, Urbino, he gave two thousand crowns: a donation in those days considered worthy of a monarch. This man died when Michael was eighty-two, and his aged master remained with him day and night in his last illness, and afterward wrote this of him: "Urbino's death has been a heavy loss to me, yet also an impressive lesson of the grace of God; for it has shown me that he who in his lifetime comforted me in the enjoyment of life, dying, has taught me how to die — not with reluctance, but even with a desire for death."

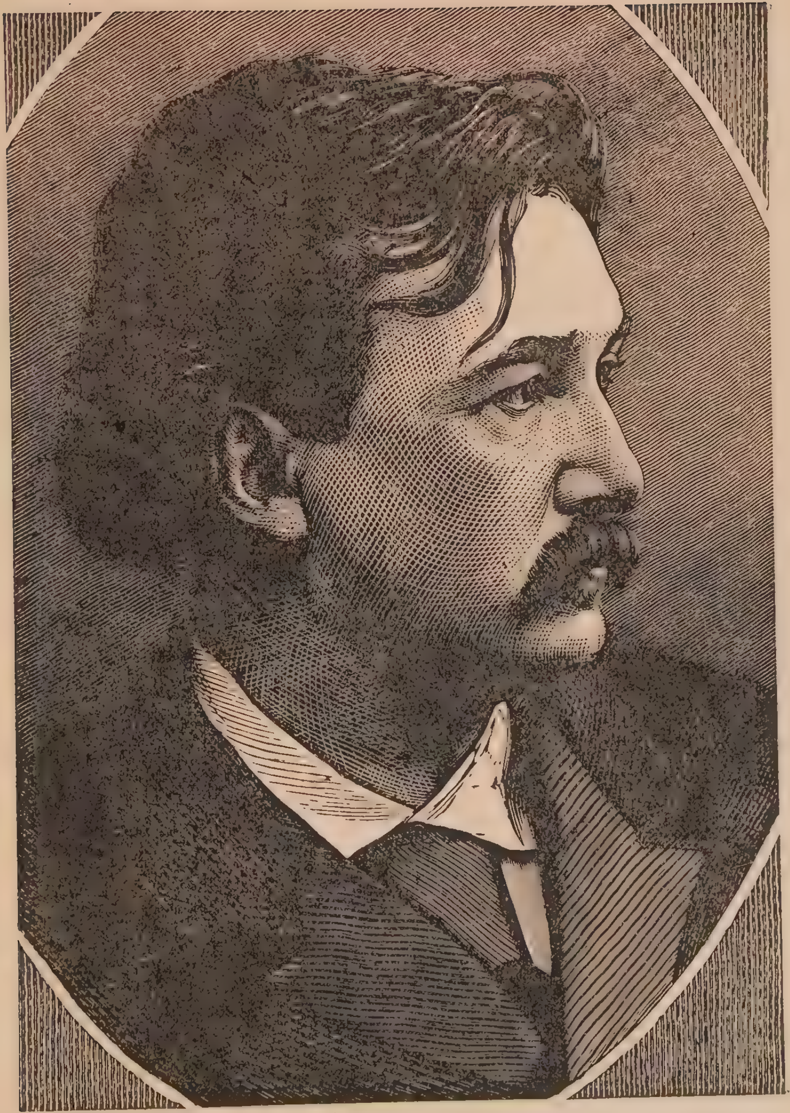
His poems were numerous, and all breathe the spirit of purest Christianity. The sternness of his character won little affection from his contemporaries, yet none ever breathed a word against him. The fame of Michael Angelo's works will live forever, and with that his memory as a truly great and virtuous man.

PAUL GUSTAVE DORE.

PAUL GUSTAVE DORE, whose likeness we have the pleasure of presenting, is one of the greatest living artists of the present age. He is now forty-six years old, and just in the prime of his useful life. For over thirty years he has devoted himself to art, and produced over 45,000 designs. and among them many of the finest pictures in existence; especially may this be said of his biblical and other religious illustrations.

While but a boy, he manifested such superior taste in art, and showed such a love for drawing, that his father indulged the passion, and sent him to the lyceums in the city of Strasburg, France, the place of his birth, and before reaching the age of twelve he had won considerable notoriety from the lithographs he produced. Soon after he went to Paris to complete his education, and here, at the age of fifteen, he brought out his first series of sketches, "Labors Herculese," and since that year (1848) he has constantly delighted the lovers of art in both Europe and America with his beautiful productions.

In 1853, when but twenty years of age, he began to exhibit oil paintings, and among the first were "Two Mothers," "Alsatian Women," "A Montebank who has Stolen a Child." About the same time he also brought out several landscapes which have held a high position in popular favor. Some of his oil paintings are very large. "Christ Leaving Prætorium" measures twenty by thirty feet.



PAUL GUSTAVE DORE.

THE ROTHSCHILDS.

IT is said that the house of Rothschild controls four hundred million dollars. The originator of this great financial house was one Maier Anchel, or Anselen, born about 1743, in Frankfort-on-the-Main, in the Jew's Street. At that time — and the feeling is by no means extinct now — so strong was the prejudice against the Jewish people that social and business usages forbade their mingling with their so-called christian neighbors.

This Maier Anchel was intended for a rabbi, but his taste not running in that direction, he left school and began trafficking in rare coins and antiquities.

At the age of thirty he was married, and settled as a broker on his own account in Frankfort. His business continued to be dealing in money, gold, silver, plate and antiquities. Stocks and public loans were in the infancy of their existence; but his business somehow was very prosperous, and in 1770 he operated in a large enough way to be termed a banker. Merchants of all kinds in those days had some sign or insignia over their doors which interpreted their traffic to the stranger or questioning eye. Maier Anselen, or Anchel, adopted that of a red shield, called in German *roth schild* (pronounced *rote shilled*), and he soon came to be spoken of collectively with his sign, as — Rothschild. Becoming so much better known by his sign than by his own name, he adopted it, sinking his own cognomen entirely.

About the year 1801, Rothschild, as we shall henceforth call him, was introduced to the landgrave of Hesse

Cassel, who, from a happy incident at their first interview, chose him as fiscal agent. In 1804, Rothschild began his system of loaning money to governments. When Napoleon won the battle of Jena, the landgrave, who was a partisan of Prussia, fled from his dominions, first placing all his money in Rothschild's hands. This money Rothschild loaned out, as governmental emergencies required, reaping heavy profits from these transactions. The landgrave's money, something like the sum of $1,250,000, remained in Rothschild's possession several years, and by this means was laid the corner-stone of the vast possessions — five million dollars — which the founder of the Rothschilds left when he died. From his five sons, Anselm, Solomon, Nathan, Charles and James, it is said he exacted an oath upon his death-bed that they would keep the business intact, extending it as much as they could, but always in partnership, so that the world would only know one house of Rothschild. The oath was strictly kept, with the exception that Nathan proving rather the smartest, he became virtually the head of the house. Meanwhile Nathan, before his father's death, obtained permission to go to Manchester, which was then excitedly entering upon the cotton business. His father advanced him $20,000, with which capital he became money lender and pawnbroker, also speculating in raw cottons and prints. He prospered in all these speculations, so that ere long his $20,000 had increased to $200,000.

Soon after this he left Manchester to settle in London, thinking that money-lending would be a sure business anywhere. Eventually, the five brothers took possession of the chief centers of European commerce. Anselm remained in Frankfort; Solomon was sometimes in Berlin and sometimes at Vienna, Charles in Naples, James in Paris, and Nathan in London.

In 1806 Nathan married a daughter of one of the richest Jew merchants in London. In 1810 he began to trade in government securities. Without the aid of railways and telegraphs, he devised means to gain the earliest information of war or financial movements of those governments whose paper he held. He had swift row-boats at his command, and he also trained carrier-doves to bring him messages.

The Rothschild conscience never seemed to have any scruples as to the means used to accomplish for them monetary successes. Misrepresentation of the rise and fall of securities was often resorted to; and when stocks had been thrown down, they purchased largely, and managed again, by secret agents, to bring them up to the highest point, when they sold out and threw the loss upon others. So the right-minded need not envy the Rothschilds, for their wealth is not builded on a solid foundation. A great business capacity is one thing, and a gamester's tricks quite another.

Numerous anecdotes are related of Nathan, the great banker, to show that he was afraid of strangers if anything unusual appeared in their manner toward him. Sometimes he yelled "murder," and brought in a host of clerks, because those who sought an interview with him stammered or shuffled about uneasily, daunted by the august presence of the Jew. From this fact, the reader will find that *too much money* is as bothersome in some ways as too little is in others.

Each brother had a share in all the other brothers' concerns; in this way they braided their fortunes and interests together. They also made a law among themselves to intermarry, so that the Rothschilds' wealth should remain unbroken. Poor fools! hoarding their perishable gold behind breastworks of clay, their spiritual vision bounded in by their bank accounts — for what purpose? Why to secure *silver handles to their coffins!* Oh, thank God, my reader, if there are no stacks of gold and piles of jewels built up between your eyes and the light streaming down from that near *country*, where gold and great possessions will not give us peaceful entrance.

We read that Baron James Rothschild has a tendency for display. His chateau, his grounds, his carriages, his plate, his festivities, are on a plan of fabulous extravagance. His pictures, his furniture, and the whole appointments of his establishment, realize almost the "Arabian Nights," or a fairy tale.

Death will, doubtless, cause a struggle to loose this man's hold of earth; but he who holds his hands open, so that whatever falls into the palms may as easily pass off them, shall be ready to seize the victor's crown when the final struggle is over.

Let every person, old and young, remember that "the earth is the Lord's and the fullness thereof," and we but the laborers in His vineyard — the stewards of our Creator's riches; let us then be faithful to our trust, accepting patiently our humble lot, and, peradventure, we may be bidden to come up higher.

* * *

JOHN JACOB ASTOR.

THE father of John Jacob Astor belonged to the village of Waldorf, Duchy of Baden. One after the other of John Jacob's brothers left the Duchy of Baden, seeking employment. One found business in London, another in Germany; still a third in New York.

After his mother's death and the installment of a stepmother, John Jacob, we may imagine, was often lonesome and sick of home. How anxiously the boy awaited the arrival of letters from his brothers; indeed, it is told on good authority that he once walked, in one day, the distance of forty-five miles, to possess himself of one of these precious missives.

It would seem from all accounts that considerable attention was paid to his education, but dreams of America haunted the boy's sleeping and waking hours.

Just after our country had arisen from the scorching and burning fire of the revolutionary war, like a phœnix from its ashy bed, the young man, then seventeen years old, with all his worldly possessions on his back, and two dollars in his pocket, started out to learn what the world had in store for him.

Later in life he used to relate that, seated under a tree just outside of Waldorf, he resolved to have for his words, honesty and industry; and, added to these, a determination never to gamble.

He engaged to work his passage on one of the timber-rafts cut from the Black Forest, that are commonly rowed down the Rhine by emigrants who, anxious to reach the coast, are thus enabled to work their passage and secure a small sum besides.

Fourteen days of hard but pleasant labor, and the lad found himself at a Dutch seaport, with sufficient money to pay his passage to London, where he was warmly welcomed by his brother, who, at that time, belonged to a pianoforte manufactory, known as that of Astor & Broadwood.

Here John Jacob strove earnestly to acquaint himself with the English language. He also made every effort to learn the nature and customs of the people of America, where he was still determined to try to make his fortune. By the strictest economy — by rising at daybreak, by living with great frugality, and by two years' labor in his brother's place of business, he had saved enough to carry out his plans.

In November, 1783, he embarked for Baltimore, possessing five pounds sterling after paying his passage, and with seven flutes as stock in trade to commence business with.

There is a very suggestive anecdote told of him at this time of life. Being a steerage passenger, on one occasion venturing upon the quarter-deck the captain roughly ordered him forward. Twenty years after, this captain commanded a fine ship owned by this same steerage passenger. It is to be hoped that John Jacob softly argued to his employé the danger of insulting the humblest personage in our free land.

Within a day's sail of her destined port, the vessel containing Astor became fastened in the ice, and was delayed two months; a delay, however, that was the means of placing him on the road to fortune. He formed the acquaintance of a German whose life and career, as narrated by himself, proved very interesting to the ice-bound passenger. He had emigrated to America a few years before, and opened a traffic with the Indians for furs, which he carried to England and sold to great advantage. Investing the proceeds in trinkets and goods appreciated by the tribes of red men, he was about to enter upon the trade in an extensive manner. He kindly advised Astor to embark in the undertaking, and instructed him in the art of buying, packing, transporting and preserving the furs.

In March the ice broke up, and the ship came into Baltimore, from which place Astor and his German friend traveled in company to New York.

John Jacob immediately sought his brother, who gave him a cordial greeting. But the brother's fortune was not sufficiently prosperous to allow him to establish John Jacob in business, so he hired out in the store of an aged and benevolent Quaker for a mere pittance, besides his board. This store was in the fur trade, and as young Astor strictly adhered to his good resolutions in regard to moral and trustworthy conduct, it was not long before his employer appreciated the worth of his assistant, and at length he was sent among the Indians on the annual tour of buying furs. Here he evinced a peculiar talent and was successful. The labor was severe, the journey to Montreal having to be made on foot or in canoes, and the difficulties in the way of traffic being enormous.

About the year 1786 Astor began trade for himself. From his own earnings, and with his brother's aid, he collected a few hundred dollars, with which he bought trinkets and set up a little store in Water street. He afterward related that at that time, as he passed the grand row of houses on Broadway, he resolved that some time he would build a greater house than any of them. The "Astor House" was the thoughts developed.

His confidence in himself was one of the distinctive attributes that contributed to his success. He did his own bargaining, and cared for his own wares. He traveled so far and so frequently that the State of New York was as thoroughly known to him as a map.

As soon as he had secured a number of bales of furs he took passage in a ship bound for England, and then conveyed them to London, where he not only disposed of them to advantage but established a business connection that was of great advantage to him. He kept his little store in New York with its dingy sign. In 1790 the New York City Directory contained in its columns the following: "Astor, J. J., fur trade, 40 Little Dock."

This was seven years after his arrival in this country. About this time Astor married a woman of sound judgment and sterling worth of character.

Meeting haps and mishaps, Astor still journeyed after peltries, and many laughable incidents are related concerning broken axles and miring in swamps, and mistaking routes in the wilderness.

Astor's business increased rapidly, and in 1794 he owned the ship which carried his furs to London, and in which he occasionally made trips himself. He now employed others to bring in his furs, and studied commercial business and the markets of Europe. He next commenced trading with China, which steadily grew until it reached an enormous business. That business was continued for twenty-seven years. China was an excellent market for furs. With some occasional exceptions his outward cargoes were harvests of profit to him. In 1800 he was worth a quarter of a million dollars.

With rare good judgment he purchased lots without or within the city limits. He foresaw the future growth of the metropolis. By these purchases he gained hundreds of thousands of dollars.

In 1830 John Jacob retired from active business, and it was then that he resolved to fulfill the promise of his youth, and build in Broadway a house larger and costlier than any that then stood there. This was the Astor House, and after it was finished he gave it to his oldest son.

Then he bethought him to give something to the city which had been his home since he was a penniless stranger. He advised with some particular friends and his son, and the result of that conference was the magnificent Astor Library. It contains something like 135,000 volumes, upon every conceivable subject. This is a better monument to Mr. Astor than a bronze or marble one.

In 1848 he died, aged eighty-four years. He left property estimated at twenty million dollars.

He made some charitable bequests. One of fifty thousand dollars to his native village of Waldorf. This was divided into several portions: one for the benefit of emigrants; another for orphans; still another for the aged and blind.

It is related of Mr. Astor that he was very close in his bargainings, and occasionally "stood in his own light." So, too, often there is some taint of moral weakness in the most wonderful characters.

His son William, possessing his father's shrewdness, illustrates this passage of Holy Writ: "Unto him who hath shall be given"; and, doubtless, the remote generations of Astors will be rich enough from the increase alone of the wonderful property accumulated by that penniless boy, who, sailing away from his native Waldorf, became a millionaire in America.

We believe that, as the test of true greatness in the eye of the Almighty is applied to His creatures, many a man and woman unknown of fame "will be greater in the kingdom of heaven than these rich men"; yet it is stimulating to the energies of body and mind to read of the wonderful financial successes of these young men, who proved that "where there is a will there is a way" to success.

* * *

GREELEY'S SPECIMENS.

ONE day, while scrambling out of the great hole in the ground near the *Sun* office which the *Tribune* people have filled up with costly brick and granite, as a monument to the founder of that paper, we picked up a piece of copper ore. The bit of green rock recalled to mind an amusing incident in the life of the late Horace Greeley. It occurred many years ago, long before the great war was begun, and before the great philosopher of Spruce street had dreamed of being the democratic candidate for president.

The interior third story editorial room on Nassau street, so long occupied by Mr. Greeley, had become exceedingly dingy. Its furniture was in the last stages of dilapidation. Various propositions to improve it had been vetoed by the occupant, who feared that any attempt at a change would derange the order of his papers and books of reference. But one Saturday, while the sage was chopping wood at Chappaqua, the burly engineer, Patrick O'Rourke, came up with a host of helpers, and pretty soon had everything topsy-turvy. The carpet was torn up by the roots and the subsoil shoveled out from under it. The furniture was hustled aside, the walls were scraped and papered, the woodwork painted, a new carpet laid, and by nightfall Patrick, as he surveyed the wholesome change, congratulated himself on the wondrous achievement.

Next day Mr. Greeley, coming in fresh from the serene influences of Dr. Chapin's sermon, was struck dumb with wonder at the metamorphosis. Without a word he slumped down into his easy-chair and thrust his feet under the desk, apparently in fine mood to do justice to bleeding Kansas, or castigate the rascally Free Traders. Hardly had he touched his seat, however, when he sprang up as though stung, and pointing under his desk, shrieked in his squeakiest tones:

"What —— thief has stolen my specimens; w-h-e-r-e's my specimens?"

The people from the outer office rushed in at the row, and pretty soon Mr. Greeley was apprised that Patrick O'Rourke was the leader of the vandals who had despoiled his sanctum.

"Send him up here!" yelled Horace, "send him up!"

So Patrick was summoned from the vaults of the establishment, where he was engaged, like the good Deacon Smith's wicked partners, in getting up steam on Sunday for Monday's paper. O'Rourke came in, expecting to be complimented for his thorough work.

Slowly wiping the perspiration from his forehead on his bare, brawny arm, he drew up to the editor, his face wreathed in smiling anticipation. But the sight of Horace's angry countenance warned poor Patrick that a storm was imminent.

"What is it, Mr. Greeley?" he mildly queried.

"Pat, where's my specimens?" screamed Horace, pointing to the vacant spot under his desk.

"Specimens, Mr. Greeley? — specimens?" meekly responded Patrick.

"Yes, the specimens I kept under there!" said Horace.

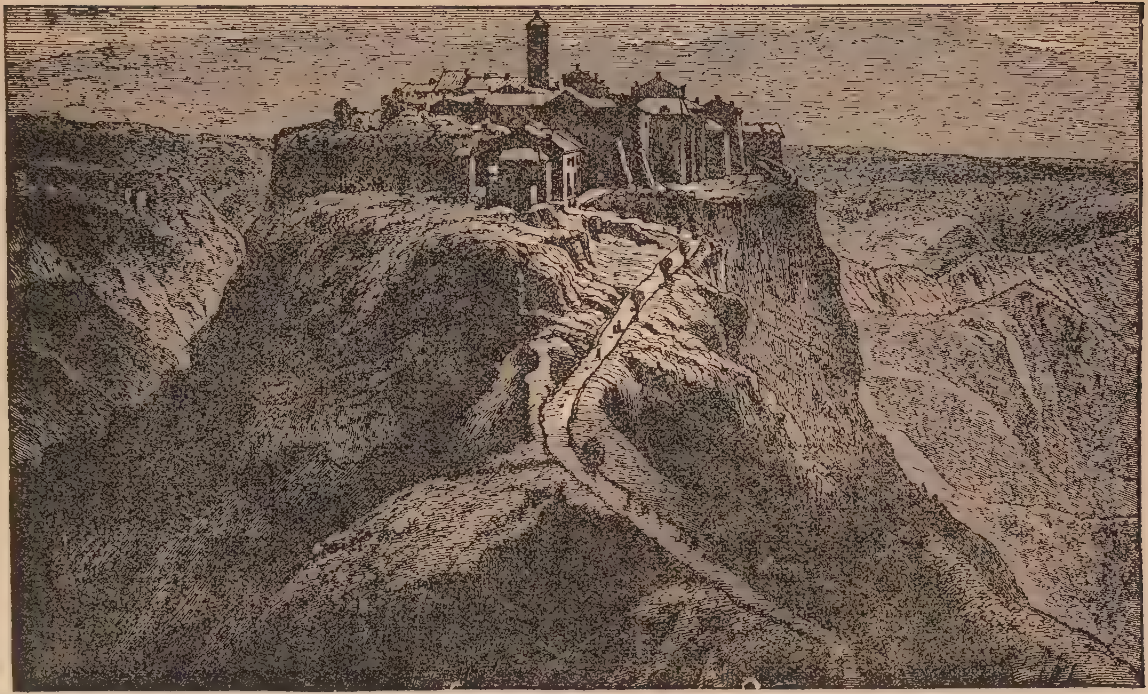
"Well, Mr. Greeley," blurted out Patrick, "I don't know anything about yer *specimens*; but if ye mane that ould type-box full of rocks ye kep there, why they only littered up the place, and I threw 'em into the street."

"You old fool!" screamed Horace. "Didn't you know that box of specimens was all I had to show for twenty thousand dollars' worth of copper stocks?" and the good man sank hysterically back in his seat to ponder on his misfortune; while poor Pat, thoroughly humbled, hurried out to recover what he could of the lost treasures. He succeeded in finding some of them, and put them in the cellar for safe keeping.

This was long, long ago, and here, now, is a solitary fragment of that time turning up under the laborer's mattock, and testifying to the generous nature of one who might have been a Crœsus had he been less credulous; who might, had he been more worldly-minded, have built in his own lifetime, out of his own hard-earned wealth, the stately structure it was the dream of his life to found, but whose erection he was never destined to witness. The dreamer is now dust; the busy life but a recollection. Of that great fortune which he won there remains to his children but a crumbling fragment, comparatively as inconsiderable as that bit of copper ore.

THE SILENT MONKS.

AWAY upon the hill that overlooks Naples, and just under the grand Castle of St. Elmo, stands the Carthusian monastery of San Martino. The monks who once inhabited the glorious palace — for it is nothing less — were men of noble birth and vast fortune. Founded in 1329 by Duke Charles of Calabria, it was enriched by the wealth of the monks, and the church is now one of the most magnificent in Italy. Agate, jasper, lapis lazuli, amethyst, Egyptian granite, and fossil-wood, together with marbles of every tint, are blended in mosaics that line the whole edifice, and the carvings are so rich and graceful that the interiors of some of the chapels seem like Eden bowers transfixed by a miracle and frozen into stone. The decorations of the high altar, since despoiled by the French, were of gold, silver and bronze, and even diamonds were set in its exquisite ornamentation. There are cloisters of white marble, gardens, courts and balconies overhanging the city, from which the view is indescribably magnificent. And in this lovely spot came a brotherhood from the first circles of society and buried themselves in this gorgeous tomb, for it was little else. The monks took a vow of perpetual silence, lived apart, ate apart, and met only for the unsocial hours of prayer, when each was wrapped in his own meditation and no one uttered a syllable. Each of the little cells where they slept had a small window or closet for communicating with one of the corridors, and into this closet was placed the frugal meal, which was then taken into the cell and eaten in solitude. Every quarter of an hour a bell struck to



MONASTERY OF SAN MARTINO.

remind the listeners that they were so much nearer their death. In the garden the railings are ornamented with marble skulls, and the only sound that disturbed this splendid solitude was the tread of sandaled feet, the rustle of long white robes, or the clang of the bell that tolled off their solemn lives in brief moments, that yet might have seemed long to them. These monks, like most others, have been driven from their retreat and all their treasures were confiscated by Victor Emanuel.

CLEOPATRA.

IN looking at the life of Cleopatra we must consider many things. We must go to different surroundings and different influences than our own. We see a rich, ill-regulated nature overflowing like the Nile from its very abundance, and we who have been kept in decorous channels are astonished at its lawless outgoings. But we must contemplate her either in a philosophic manner, or regard her with disgust, wonder or admiration, according to our various characteristics. The first is the wisest method, and one that we will attempt.

She was the daughter of Ptolemy Anletes, and born sixty-eight years before Christ. Divers descriptions have been given of her person. We prefer that which best accords with her character. Her lips were full, too full, and not exquisitely modeled. She had an unequivocal pug nose. Her eyes were dark, almond-shaped, and with a glorious midnight beauty of their own when they sparkled with merriment, or when the drooping lids helped to darken the fathomless depths beneath. But those same eyes could give fierce, cruel glances, and you never doubted for a moment that their owner could use swords or daggers whenever they suited her purpose. Her olive complexion was well set off by her black curling hair, whilst on her cheeks was a rich glow, like the crimson of an Egyptian sunrise. Her form was rounded to luxuriousness, and of faultless proportions. In short, her beauty was of a kind that would bewilder, fascinate and dazzle the beholder, but it would not call forth the noblest emotions of which a man ought to be capable. A proud woman would have felt herself inexpressibly humbled to know that she could only enthrall the senses of an earthly lover. A conscientious woman would have experienced measureless pain, shame and remorse had she returned such a passion; but Cleopatra, although possessed of a gifted and cultivated mind, besides being an accomplished musician, was not a woman to shrink from the grossest admiration.

To herself and younger brother, when she was seventeen years old, was given the Egyptian crown. To this brother, two years her junior, she was married, after the custom of the country. He was her inferior in mind as well as years, and the pair heartily disliked each other.

There is no hate in all the world so strong as that which an energetic, unprincipled wife may feel for a husband to whom she conceives an aversion. Cleopatra shrank from his touch with more of abhorrence than from a serpent's. She shuddered at his approach. She loathed his very look. This detestation was further increased by her fear of him.

The people in those times had an antipathy to the rule of a woman. Her husband and brother sympathized with these. He was her enemy,—a clog to her ambition. He, acting under his advisers, refused to allow her a share in the administration of the government. Cleopatra appealed to Cæsar, who warmly espoused her cause. Her brother's party was defeated in battle and himself killed. Cleopatra was firmly seated on the throne of Egypt, and did not hesitate to accept the love Cæsar proffered her. After his death Mark Antony took his place in her doubtful affections.

We see how the coarsening influence of her uncongenial marriage had branded her heart, and produced a roughening effect on her whole character. Besides, she was so used to artful dissimulation from those around her, that she gladly welcomed the substance of an honest attachment.

In those times men loved without sentiment or delicacy, and under those circumstances we cannot reasonably expect much from the majority of women. Sooty blackness of the one sex, and pearly whiteness of the other, although it sounds prettily enough in theory, is impracticable in reality. As long as men will take great moral latitude to themselves, there will always be Cleopatras, who will disdain the barriers and break through the rules of decorum; while those women, fitted by nature, habit and circumstances for a more proper life, are too often condemned to mourn over the infidelity of husbands, or bewail the infatuation of fathers and brothers. Not until men shall really heed that portion of the eloquent sermon Christ preached from the mount, which reads "Blessed are the pure in heart, for they shall see God," will the sum of human happiness be greatly increased or virtue properly reverenced.

We do not mean to say that Cleopatra was utterly heartless, for in most evil persons there is an admixture of good, and the gratification of ambition in an ambitious nature is a strong cement to any kind of affection.

It was Cæsar's potent arm that kept her queen. Afterward Antony seemed equally powerful. Then might was right. The men of that age were cruel. Deeds of blood were not uncommon, and we are less surprised than shocked that she caused her surviving brother and sister to be put to death for fear they might be rivals to her throne.

But the fitful fever of false, cruel, wicked Cleopatra's life was drawing to a close. She kept Antony by her side when he ought to have been in the field of battle. She deserted him when he most needed her aid. Finally she betrayed him to his enemies. In these acts are all the inconsistencies of a jealous, loving, unprincipled woman. To appease his anger, she caused it to be reported to him that she was dead. On hearing this he fell on his sword and received a wound that soon proved fatal. She sent a contradiction to the false statement, and he was taken to her, and expired in her arms. A poor compensation for the loss of everything that a man in his sober senses holds dear!

She was at last in the power of Octavius Cæsar, whom she tried to fascinate. But he scarcely deigned a glance at her haggard and sorrowful face and voluptuous form. She read her fate in his cold, averted look. He meant that she should be led in triumph before his car. All that remained in her of womanhood rebelled against this. She recklessly took her lot in her own hands, and terminated her life, either by poison or by the bite of an asp; it is not known which, but is commonly believed by the latter means.

With her ended the family of the Ptolemies in Egypt, after it had reigned from the death of Alexander, two hundred and ninety-four years; for Egypt, after that, was reduced to a Roman province, in which dependence it remained till it was taken from them by the Saracens, A.D. 641.

THE NIGHTINGALE.

THE name of this bird is derived from the Saxon *niht*, night, and *galan*, to sing; or, the night-singer. Antony calls Cleopatra his "nightingale," and says:

> "The nightingale, if she should sing by day,
> When every goose is cackling, would be thought
> No better a musician than the wren."

This charming bird may be traced from England, through Germany, Poland, France, Italy and Palestine.

It is the largest of all the warblers, being about seven inches in length, and between ten and eleven in the extent of its wings. The upper parts are of a deep yellowish-brown, inclining to reddish-brown; the quills and greater coverts are dusky brown, with reddish-brown margin; the tail deep reddish-brown, and very slightly forked; the sides of the neck, ear coverts, breast and flanks, pale ash-gray, passing into grayish-white on the throat and lower parts; an obscure, dusky streak going from the gape down the side of the neck, and into the gray of the breast. The colors of the female are like those of the male. The bill is wood-brown, with the basal end of the lower mandible pale yellowish-brown; the tarsi (which are long) and the toes are of the same color.

It is a migratory bird, passing the winter in northern Africa, but in the summer found over the greater part of Europe, even to Sweden and temperate Russia. It is said not to be found in Great Britain north of the Tweed, and is plentiful in some parts of England and is never heard of in others. The writer has frequently listened to the song of the nightingale in different places in the neighborhood of London, and in its finest voice in the Isle of Wight, near St. Lawrence. It is found in Sussex, Dorsetshire, Somersetshire, and in the eastern part of Devonshire, but not in Cornwall. It frequents the greater part of Yorkshire, but is unknown in Lancashire, though it has been heard in Carlisle.

Sir John Sinclair endeavored to introduce this delightful songster into the groves of Scotland, exchanging the eggs of robins for those of nightingales. The young birds were hatched and brought up by their foster-parents; they migrated in September, their usual time, but never returned to the place of their birth. A similar experiment was made at Swansea with the same result. Enos is its Welsh name, but Wales is not known to possess it. Leyden asks:

> "Sweet bird! how long shall Teviot's maids deplore
> Thy song unheard along the woodland shore?"

And the same lament may arise from the daughters of Erin. The nightingale begins to appear in the middle of France about the first week in April, and in England a week or ten days later. The males first venture across the channel, disperse themselves over the country, resort to thick hedges, copses and plantations, pour forth their songs at eve, and await the arrival of their mates, which is sometimes delayed beyond a few days by cold and uncongenial weather. Most artfully and carefully concealed are the nests they build. Composed externally of dried leaves and grass, or of the skeleton leaves which strew the banks and thick bottoms of hedges, the little dwelling is lined with hair and soft fibers. Calculated to deceive the eye, it is placed low down in a thick bush, or luxurious hedge, among intertangled stems. The eggs, of a greenish-brown, are five in number.

Nightingales are very shy, remaining concealed as much as possible among the foliage. Although their song is heard at intervals during the day, it excites the greatest admiration on quiet evenings an hour or two after sunset. When the moon is nearly full, and the weather is serene and still, it may be heard till midnight, and is then exceedingly pleasing.

Virgil and other classical poets, from the melancholy character of part of its song, call it *miserabile carmen;* though it would seem an insult to modern poets to hint that the song of the nightingale has been ever estimated in comparison with that of other native or foreign birds, some have gone to the extreme of regarding it as inferior to that of many thrushes; its natural song is certainly very sweet, but not more so, in the opinion of Audubon, than that of the black-capped warbler, and but little, if at all, superior to

THE NIGHTINGALE.

that of the woodlark; the song of the skylark is far more spirited, more prolonged, and of much greater compass, though less sweet; the notes of the American mocking-bird are very much sweeter, more varied, and of greater compass, power and duration; and many birds, which naturally have no song, like the bullfinch, can be taught to sing in perfect time and tune, which the nightingale can not. But take it as a whole, it must be confessed to be superior at least to that of all British songsters.

Isaac Walton observes of this noted song-bird: "He that, at midnight, when the very laborers sleep securely, should hear, as I have heard, the clear air, the sweet descants, the natural rising and falling, the doubling and redoubling of her voice, might well be lifted above the earth, and say, Lord! what music hast thou provided for thy saints in heaven, when thou affordest bad men such music on earth!"

The males only sing, and, like other migratory birds, never during the winter in cages, and not until after the spring, moult. They are short-lived in captivity from being kept too warm and from improper food; this should be chiefly insects, or small bits of meat, and fruits.

Dr. Latham states that, "as is usual with the migrating warblers, the male remains on the spot to which it first resorts, attracting the female by its song; and if by accident the female is killed, the male, which had become silent, resumes his song, and will continue to sing late in the summer, till he finds another mate, in which case they will breed at a later season."

* * *

FAIRY-BELLS.

I AM sitting alone in the twilight, watching the flames that leap and play among the coals in the grate. A deep stillness pervades the house. It seems like an enchanetd castle, and the flickering shadows that the fire-light throws upon the wall are spirits striving to cast a spell over me. Their long arms beckon weirdly, and seem to clasp one another in a mystic dance; the heavy *portiere* rustles on its brass bar; and an old Indian idol, that stands in an opposite corner, leers at me with its sightless eyes, and nods as much as to say, "I am in the secret." On the mantelpiece above me is a stuffed white owl, who though familiar to me from childhood, regards me to-night with peculiar solemnity, and the eyes of the great moosehead over the door watch me pityingly. Outside, the wind is howling and moaning, now sending a blinding storm of snow against the casement, now tapping mysteriously on the window pane. I could almost swear that some one was hiding behind the curtains, the shadow is so dark there, and they look so stiff and important. What is that plaintive sigh? Can it be only the wind? And why does that bust of Shakspeare, that rests on the high oak book-case, smile in a mocking manner, while all the family pictures on the walls are whispering together?

Unconsciously I yield to the magic around me, and, sinking back in my arm-chair, am not surprised to see the owl flap her wings and, with a loud "tu-whit," soar high into the air; while from among the glowing coals a troop of gossamer-winged little fays flutter out into the room. The tall book-case grows taller, darker. It is no longer a book-case, but a grand old oak tree. The scene has changed, and I am in a forest. Soft moss covers the ground, and sunbeams play among the branches of the trees. Magnificent trees they are, which have probably stood there, staunch and true, for many a generation. There is a holy calm in the air, like the stillness of some cathedral, for the only sound is the murmuring of a woodland brook, and the shaking of the leaves caused by the quick movements of the squirrels, who are busy gathering in their winter supply of nuts and acorns. Suddenly a sob breaks upon the peaceful quiet, like a discordant echo; and, looking closer, I see a boy curled up at the foot of an oak, resting against a bundle of dry sticks and weeping bitterly. He is not more than thirteen years old, and he has large, mournful, dark eyes, a noble, sensitive face, and dark hair that curls about his brow. His dress marks him as a peasant, yet his intense grief betokens a finer sensibility than is usually found among that class.

The squirrels pause a moment in their work to watch him curiously, and from the recesses of the forest hasten the same band of fairies whom I saw spring into existence in the dancing fire-light. They glide through the air with a delicious, dreamy movement, while their flame-colored robes of airy texture gleam in the sunlight, and their sparkling wings and waving hair denote what joyous little sprites they are. They cluster wonderingly around the weeping boy and stroke his hair and brush their downy wings over his cheeks: but in vain, for he can neither see nor feel them. Then I notice that each wears a shining coronet and in each coronet hangs a miniature bell, pale blue in color. Gathering in a ring, they circle round and round the boy, advancing and retreating as in a graceful dance. And with this harmony of motion comes a harmony of music, for the fairy-bells ring out together in a strain of the most exquisite, unearthly music,—delicate, tender and inexpressibly sweet. Does he hear it, or are the sounds too fine for his dull, earthly ears? Yes, he does hear it. He raises his head and a divine expression of comfort steals over his face. His grief is lightened, and high resolves and noble thoughts are rising in his mind, as he listens to the melody which floats like a prayer up through the blue ether. Fainter, fainter it grows; and finally sinks into silence, and the fays, with glad faces and antic mirth, flutter away on some other errand of mercy.

Meanwhile a little maiden, who can scarcely have seen more than nine summers, is skipping down the forest-path. Her golden hair falls in two long plaits to her waist, and the round white cap gives her rosy face a demure expression that is very attractive. Her blue eyes sparkle with health, and on her arm hangs her knittings bag, with its shining needles and half-finished stockings.

"Good morning, Karl!" she says in German; "see what a fine bunch of wild flowers I have picked to take to thy mother! The house-mother has carried her some broth and wheaten cakes, and now she must get well. It makes me sad to see her sick and lonely."

Karl has risen to his feet and responds gratefully: "Thou art heavenly kind, my Gretchen. Truly the mother is better, and if I can get work so that we shall not be so poor, I shall be happy indeed. But I must go up to the castle with a message for the steward. Good-by."

"Good-by, Karl! Don't forget to carve me the image of the Christ-child that thou hast promised me."

There is an anxious tone in her voice, and he hastens to reply, as he lays one hand caressingly on her shoulder: "I will carve thee whatsoever thou wishest, for I love thee, little Gretchen."

"And I love thee, Karl!" she says with a sunny smile; and, rising on her tiptoes, she puts up her lips for a kiss, and then trips away and out of sight, singing as she goes.

Karl watches her for a moment, and then turns resolutely and trudges off in the opposite direction. As he goes the forest seems to recede, and I can see him ascending a hillside by a winding road that leads to a stone castle, whose towers rise proudly above the surrounding hamlets. Below, a river flows between green banks, brawling over the pebbles and glistening in the sunlight that bathes both castle and river in its warm light. Laborers are at work in the fields around, and Karl has to answer numberless greetings as he passes on his way. A cheery shout of "Karl! Karl Berger!" causes him to look back and see a large, respectably dressed man toiling up the hill and panting for breath. Around him hover the fairies, urging him on and ringing their tiny bells in innocent glee.

"Good-day, Master Forester! Thou art somewhat warm," exclaims the boy laughingly.

"Warm!" echoes the other. "Himmel! I should think so. I have been over nearly all the estate to attend to the baron's last order. My Gretchen tells me that thou art wanting work, Karl. Is it so? Yes? Then I can give it thee, lad, for there is much to be done now, and I would not have the widow's son begging his bread. Hush! say no more about it, or thank Gretchen if thou wilt. Look! What is it that shines so at thy feet?"

Karl stoops and picks up a glittering coin, which the kindly fays have dropped in his path; and, as he does so, he hears again the faint music of the fairy-bells. "It is a luck penny!" he exclaims in awe, and though the forester smiles incredulously, he fastens it carefully in his neckerchief, regarding it as an omen of happier days from the gentle influences that attend his fate. The beneficent sprites, seeing that their message is understood, fly back to the forest, while Karl and the forester bow low to a young lady who is riding by, followed by a groom, and who returns their salutations by a smile and a playful gesture of her riding-whip. She speaks to her horse, and the proud animal tosses back his mane and bursts into a canter. In another moment they are far away, the girl's dark curls and blue riding-habit fluttering in the wind.

"Ma'amselle fears nothing when once on horseback," says the forester, looking after the fast retreating figure. "She has a true, kind heart, though she loves her own will right well. Ma'amselle has a fancy for my wee Gretchen, and often has her at the castle, and I doubt not she'll lend thee books to read if thou hast a taste that way, Karl."

So talking, they enter the castle-gate and disappear. A mist gathers over the scene, shutting out castle, field and forest, and falling lower, lower over the glancing water till that, too, is hidden from sight and all is dark. Yet in the darkness I can hear the fairy-bells, ringing a strain of hope and peace, and finally dying away in the distance. As the music ceases, the clouds part and I can now see the interior of a home-like, German cottage. In one corner of the room are fishing-rods, a gun and a hunter's pouch; while from the rafters overhead hang bunches of fragrant herbs, and over the door is a horseshoe, for protection against evil spirits. The sanded floor, the shining tins hanging upon the wall, the few rude benches and wooden table, all bear token of comfort and cleanliness, and are in keeping with the appearance of the woman who sits at the table, knitting by the light of a solitary candle. Near it is a young man with his arms crossed before him on the table, as he reads aloud from an enormous book.

Can that tall, broad-shouldered young fellow be Karl? Yes, those are the same dark curls and earnest eyes, though now there is a mingled expression of courage and self-reliance in his face that was wanting before. The mother who pauses so often in her work to look at him, with tender love and contentment shining in her eyes, neither understands nor listens to what he reads, but when he closes the book and, resting his head on his hand, falls into a reverie, she rises and bends anxiously over him. She does not see the fairy visitors who are hovering around him. She does not hear the elfin music that is ringing in his ear. She strokes the dark hair with the mother-touch that is always gentle, no matter how rough the hand may be, and Karl answers her look of inquiry by a reassuring smile. Karl no longer wonders at the fairy-bells. He has grown to love the unknown music that consoles him when he is sad, rejoices with him in his joy, and sounds "jangled out of tune" when he does wrong. Bravely and well has he labored for his widowed mother, and the happiness that pervades the cottage is owing to him. What wonder that the fairy guardians smile, well pleased, over Karl, as they wing their flight from the room redolent of sweet home-love out into the summer night!

Again a thick mist obscures everything from my sight, and when I look once more I see nothing but the village church with its spire pointing heavenward. Inside, the pastor is waiting, book in hand, while the sunshine that pours through the open window sheds a halo over his silver hair. Slowly up the central aisle advances a simple wedding procession. First comes the bride, attired in gala dress. Her flaxen hair falls in two long braids to her waist; her blue eyes sparkle with happiness, and her innocent, trusting face recalls the little maiden I saw in the forest. Yes, it is Gretchen, though now she is eighteen instead of nine, and beside her walks Karl, holding her hand and looking as if he thought it all a dream. Next come the forester and his wife, and Frau Berger. Peasants follow, carrying flowers, and among them is the baron with his daughter, who glances about her with kindly interest. The solemn tones of the pastor fall on my ear as he reads the service, and now a German hymn, sung by lusty peasant voices, rings out on the air. The bride is leaving the church, treading lightly over the flowers that have been cast in her path, and glancing neither to the right nor the left lest some evil befall, according to the superstitions of the country. At the door the baron stops them, and stoops to kiss the bride, at the same time handing a heavy purse to Karl. And on Gretchen's brow fall other kisses that she cannot feel, and over Karl are breathed inaudible blessings. The fays are gathered in a mystic circle and the fairy-bells chime merrily on the breeze. Hither and thither flit the gladsome sprites in the sunlight, and Karl, repaid for past sorrow, care and labor, feels his heart swell with gratitude and love as he hears once more, clearer, sweeter, holier than ever, the elfin music that crowns his happiness.

With a sigh I awake, to find the fire extinguished on the hearth and the room in utter darkness. I hear voices in the hall and soon my solitude will be interrupted. Yet I will not reveal my glimpse of fairyland to other mortals. They would smile, and would not recognize the hidden meaning, which is, that, if we face our griefs boldly, and follow, without shrinking, the hard road of duty, we too may hear the melody of fairy-bells to cheer us on our way.

DEATH NO REVEALER OF MYSTERIES.

THE world is full of mysteries. Our origin, the laws of our being, and our dependence upon God; the relations of mind to matter and of matter to mind; the existence of evil; the harmony of providence with free will, and the very processes of our feeling and thinking, are problems which, from the earliest ages, have exercised human ingenuity. Whence we come, whither we go, and why we are here at all, are questions which puzzle as many minds now as they did when metaphysics first began to be discussed. Even in matters directly within the range of experience our curiosity is frequently baffled. Crimes are committed and the criminal remains undiscovered; motives are concealed where the deed is known; history is in a larger part made up of mere guesses; our most intimate friends have secrets which escape detection by us; and we walk through life as it were in a fog, seeing only the things that lie close around us. Hence has arisen the hope on the part of some that death will lift the vail that hides the truth, and that beyond the grave they will know all and understand all. This hope, we are afraid, will never be fulfilled.

As to metaphysics, the utmost that death can do for the soul is to set it free from the weight of the body; it cannot endow it with faculties which it does not now possess. Such as man is when he dies such will he continue to be afterward. Undoubtedly his clarified vision will perceive objects to which gross material eyes are insensible, and to that extent his intellect will be assisted. But we have no right to suppose that he will acquire any greater power of reasoning than he has now, or that he will be better able to combine ideas and draw conclusions from them. Wisely did Milton write of the fallen angels:

> "Others apart sat on a hill retired,
> In thoughts more elevate, and reasoned high
> Of Providence, foreknowledge, will, and fate;
> Fixed fate, free will, for knowledge absolute,
> And found no end, in wandering mazes lost."

We, in like manner, shall find no end that we cannot find here, and shall be lost in the same mazes, or others like them, that now perplex us.

In one respect, indeed, our ability to solve the problems of our existence is likely to be less in the next life than in this. The advance of natural science is here continually aiding us to comprehend the laws of the material universe, and thence by analogy those of unseen things. The adaptation of means to ends, the persistency of force, and the immutability of law, are daily receiving fresh demonstrations at the hands of scientific men, while the progress of discovery gives hopes of the speedy construction of a cosmic theory which shall meet every requirement of the facts of creation. Hundreds of things which puzzled our ancestors are plain to us, and in the same way what are puzzles to us will be plain to our posterity. According as the chaos of the world of sense is cleared up and reduced to order, a solid foundation is laid for the investigation of more recondite subjects; but to make use of it, the purely spiritual faculties, however they may be sharpened by the removal of the body, will be unavailing. We must have the corporeal senses which alone take cognizance of material things, and losing these we lose the help they would afford us. To this extent death will deepen the obscurity that surrounds us instead of enlightening it, and will be a hindrance rather than a help.

The like may be said of undiscovered crimes and other deeds of which we would fain know the details and the motives. In this world, such knowledge is locked in the breast of one or more men who will not reveal it; and when they die, it dies with them so far as we are concerned. Will they be any more ready to tell us when we join them on the other side of the grave? Shall we even find them out so that we may ask them? If they are lost now in the multitude that covers the earth, they will be much more lost among the countless myriads who from the beginning of creation have flitted across it and disappeared in the abyss of eternity. Or if we could find them and they were willing to tell us all they once knew, there is no certainty that they would remember it. Time works oblivion during our mortal career; and what memory can survive the endless revolutions of immortality?

Besides, the nature of the human mind itself forbids us to expect either here or elsewhere the revelation of all mysteries. To know everything and comprehend everything is not the lot of finite intelligence; it is the attribute of God alone. Sages, who have spent long lives in study and research, and deservedly become esteemed as the wisest of mankind, have always been most ready to confess the meagerness of their acquirements. Learn as much as we may, there always remains infinitely more to be learned. As fast as one height is gained another rises before us, and an ever receding goal mocks our efforts to attain it. So it is now, and so it will be hereafter. Neither in this life nor in the life to come is it possible for us to know all, and we may as well give up the thought of it.

HAND-WORK.

THE lad who owns a treadle-saw and can make brackets, wall-pockets, vase-stands, and many another pretty thing with which to ornament his home, is a happy fellow; but it is not impossible that the boy with only a jack-knife will excel him in the results of his artistic efforts before his life is half over, albeit he now envies the rapidity with which results are obtained by the saw.

The days of machinery are all very well, and we should be poky and slow without them,—but the beautiful, the artistic, the ideal things of this world are wrought by the skillful. Those old carvings which are the wonder of the times have been produced by the cunning and patient human hand. When we desire to purchase an exquisite floriated picture-frame and find the price above our means, the explanation is made to us that it is hand-work. The same is said of a finely decorated piece of porcelain. It is painted by hand. No machine has ever been invented that is as deft and satisfying as the human hand. Nature is formed and arranged by the Great Artisan, and no two things are exactly alike. Machines provide no diversity, and it is in variations that we discover delight for the eyes.

Boys and girls are too apt to amuse themselves by efforts that terminate in nothing particular. They cut papers which only make litter. They whittle sticks and shape nothing that is either for ornament or use. It is said that the Yankees are inveterate whittlers. They cut bits of stick to compose their minds when seriously arguing or bargaining, but they seldom construct anything.

It is told that the famous Sam Houston accepted for a son-in-law a young man without family or fortune, and one, too, about whose early life he knew but little, if anything. A friend expostulated with the resolute old man for his apparent carelessness of his daughter's future, and he replied:

"I watched this young man. He is a constant whittler when away from his business, and I have observed that he always has an object in view when he is at work, and he always produces a complete result that is either useful or ornamental, and sometimes it is both. A man with such a habit of brain and hand will most certainly be able to provide a living for any woman."

The idea included in Mr. Houston's estimate of a stranger ought not to be lightly thrown aside by mothers who, in the winter evenings, endeavor to provide occupation for their children. There is as much amusement in making something that is pretty, or curious, or practical, as there is in playing.

Many of the ladies and gentlemen of New York, as well as their children, are fond of carving wood, and each one seeks for a device, or perhaps originates one, that shall give pleasure by its contrast with other similar handiwork. This taste has led to much research among architectural and decorative designs of all nations as found in illustrated books. Drawings are taken from them in pencil or ink, and reproduced in carvings on wood. Picture-frames, panels for cabinet doors, table legs and tops, flower-baskets, *jardinieres*, etc., are wrought out of wood in fanciful designs.

A mantel, exhibiting base and upper shelves, and displaying elegant consoles with brackets, has just been completed by a school-girl for her father's dining-room. She has been a year carving it.

A business gentleman of New York, whose eyes have suffered from too close an attention to books during his evenings, is in the midst of carving a complete bed-room set of furniture, consisting of six pieces. These beautiful pieces of work have been his constant amusement during leisure hours for months. The set is intended as a bridal gift to his business partner.

"However did you learn to do this exquisite work?" we asked him, knowing that his occupation was large and absorbing.

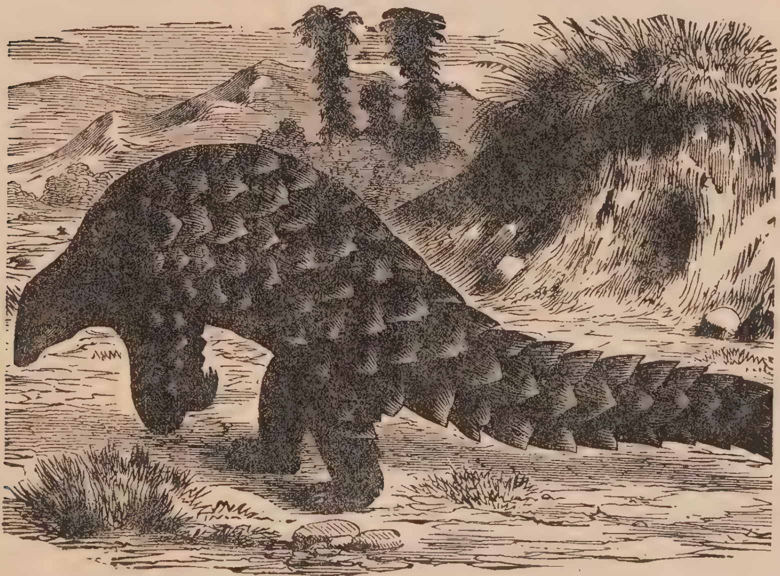
"I began making things of wood when I was a boy at home, and my mother always called my attention to graceful traceries in prints, carvings and architectural ornamentations, and she never lost an opportunity of encouraging in me not only a love for the beautiful, but a desire to attain it by my own efforts, and so from whittling the transition to carving became very easy. Indeed it was an imperceptible advancement. Any child may become a lover of the beautiful products of his own hands if he is properly encouraged and directed. I believe that a desire to produce artistic and useful articles during leisure hours will do as much for the good conduct of the young of both sexes as will a superior code of morals — and perhaps even more. In proper and elevating occupation during leisure there is always safety. It restrained me from keeping evil company."

This is one man's experience, and he has been a wide observer of men and things.

SHORT-TAILED MANIS.

WE give a fine illustration of the short-tailed Manis, called also Bajjerkeit and Scaly Ant-Eater, found very commonly in India. It is about four feet in length, and covered with dense horny scales, which overlap each other like the tiles of a house roof, and these scales are its only means of defense, as it has no teeth. When alarmed it will roll itself up into a solid ball, elevating a multitude of sharp edges, and make such a formidable defense by its armor that even large animals like the tiger vainly attempt its destruction. It subsists almost entirely upon ants. With its strong claws it will tear down the habitations of these insects, and then sit quietly, and by the use of its long, extensible tongue, furnished with a glutinous mucus, will gather in its food very rapidly.

It is an inoffensive animal, and is sometimes kept about the house of the natives; but it prefers the forest, where it can live unmolested by mankind. It constructs a habitation by digging deep into the earth, and to this it retreats when not likely to be overtaken by an enemy. After the manner of the Brazilian Ant-Bear, it curls up its forward feet when walking, as shown in our illustration.



THE SHORT-TAILED MANIS.

Dr. Hartwig says that Africa possesses a peculiar class of Ant-Eaters, which are found from the Cape to Abyssinia, all over the sultry plains where their food abounds. Their legs are short and provided with claws fit for burrowing in the earth, which they can do with great rapidity, and when once their head and fore feet have penetrated into the ground, their hold is so tenacious that even the strongest man is incapable of dragging them from their holes.

VIVISECTION.

THE practice of cutting up live animals in the name of science is not so common in this country as in Europe. Dogs are most frequently the subjects in this inhuman treatment, and perhaps the most insatiate torturer of the canine race that ever lived is Professor Schiff, of Florence, Italy. Two dogs a day are sacrificed by him in his physiological demonstrations, and it is estimated that in ten years no less than fourteen thousand of the brutes have quivered and died under his keen knife-blade. Naturally, the professor is unpopular with people who have canine pets, and recently the society with a long name tried to get up a "corner" on dogs, and deprive the professor of his prey. All the streets and alleys of Florence were canvassed, and a great army of curs bought for sixty cents a head, which were then killed in a humane manner. The scientific vivisector first cuts the vocal nerves, so that the only evidence of suffering betrayed by his victim are the pitiful writhings and agonized pleadings of the eyes. Sometimes the animal is under the knife day after day, its life being sliced away by inches. It took seventeen dogs and twenty-two rabbits, baked or boiled alive, for Claude Bernard to satisfy himself concerning death by heat. "Sentimental humbug" is what the vivisector styles the protests of humane people against this method of scientific investigation. In England public sentiment against vivisection has resulted in a law confining its practice, without the use of anesthetics, to a limited number of professional men, who must certify that their object is that of legitimate research. The opinions of physiologists themselves differ on the subject of vivisection. The celebrated Haller was tormented in his later years by haunting memories of the wretched animals he had needlessly sacrificed, and he confessed that very little knowledge was to be attained by the practice. The effects of the vivisector's cruel art on students has been often found to be debasing and brutalizing. It develops the lurking demon in human nature as hardly anything else will, and creates a reckless disregard of suffering, which is apt to extend from the animal to the human subject.

THE OCEAN WAVES.

THE force of the waves and the height to which they dash against lighthouse towers in the most exposed situations are astonishing; and we cannot contemplate them without reflecting how great a triumph of science and art these buildings are, and how strange life in them must be.

We find some interesting information on these points in the copious appendix to the Report of the Royal Commission, appointed in 1858, to inquire into the condition and management of lights, buoys and beacons — a bulky parliamentary blue-book of 1861. At the Longships Lighthouse, on the top of a conical rock opposite Land's End, the commissioners were told by the head keeper that in heavy weather waves break about the lantern seventy-nine feet above high water mark; and that on one occasion the sea lifted the cowl off the top so as to admit a great deal of water, by which several of the lamps were extinguished, and all the men were employed in bailing till the tide fell. He added that there is a cavern under the lighthouse at the end of a long split in the rock, and when there is a heavy sea, the noise produced by the escape of pent-up air from the cavern is so great that the men can hardly sleep.

Concerning the Scilly Bishops' Lighthouse, on a rock southwest of the Scilly isles, of which the commissioners say that the building is "perhaps the most exposed in the world," they give the report of the head keeper that "the spray goes over the top of the lighthouse," the height of which is one hundred and ten feet. At the South Bishop Rock Lighthouse they were informed that "spray occasionally strikes the lantern, and it has broken the lower windows of the dwelling-house"— that is, of the part of the tower so called. Yet the South Bishop Rock Lighthouse is on a rock — off the coast of South Wales — of such size that there is a patch of grass before the door, and the tower rises to a height of one hundred and forty-four feet above the sea.

The Smalls Lighthouse, also off the coast of South Wales, is on a low rock about twenty miles from land, but so large that "there is room to walk about." It is above high water mark; but we are told "the sea breaks all about the lantern of the old lighthouse, and over the new building, when there is heavy weather." The "old building" was a wooden lighthouse erected in 1788; the "new building" a stone one in course of erection in 1859, when the visit of the commissioners was paid. The commissioners add, from information given them by the head keeper, that "green seas pass up to a point about thirty-two feet above the level of the rock." If this is the case in the Irish sea, what must be the height to which "green seas" reach on the lighthouse towers in the Atlantic ocean? As to the force of the waves, although no stone had been removed from its place since the work of the new building began, an iron bar was shown to the commissioners, about two inches thick, and fixed in the rock, which had been bent like a wire.

The height to which the waves sometimes rise when they dash against rock, has been found at the North Unst Lighthouse to be far greater than appears from any of the instances already adduced. This lighthouse is one of the most recently erected on our coasts, and is of special interest as being situated at the most northern point of land in the British Islands. It is built on a *stack*, or outlying rock of conical form, of nearly two hundred feet in height, at the north end of Unst, the northernmost of the Shetland Isles. The rock, as seen from the south, very much resembles a sugar-loaf in form, and its steep slope could only be scaled with difficulty previous to the cutting of steps in it. On the north it is nearly perpendicular, and exposed to the full "fetch" of the ocean. The top of the rock affords little more space than is sufficient for the site of the lighthouse.

There is only one part of the rock where a landing can be effected, and that, of course, only in favorable weather, so that the lightkeepers are as completely cut off from communication with the rest of the world as if their islet abode were many miles from land. The dwelling-houses of their families are on the island of Unst. The first light shown here was from a temporary tower erected in 1854, at the suggestion of the Admiralty, for the benefit of the North Sea squadron in the Russian war. A temporary iron lighthouse and dwellings were constructed at Glasgow, and carried to the spot, with all materials and stores, by a steamer, and light was shown after little more than two months, although landings were accomplished with difficulty, and everything had to be carried to the top of the rock on the backs of laborers. The temporary building being nearly two hundred feet above the level of the sea, it was supposed that they would have nothing but wind and rain to withstand. But in December, during a severe gale from the northwest, the sea broke over the rock, broke heavily on the tower, and broke open the dwelling-house and deluged it with water. Similar storms occurred during the winter; seas fell with violence on the iron roof of the dwelling-house, so that the lightkeepers began to entertain serious doubts of their own safety. It was resolved, therefore, to raise the permanent structure fifty feet above the rock.

Most lonely and remote from all the ordinary scenes of busy human life are the lighthouses of Skerryvore and Dubh-iartaig; towers of one hundred and forty feet high, on rocks in the Atlantic. Dubh-iartaig is a rock of considerable size, rising above the level of high water, but over which the waves break in a moderate gale. It lies in the open ocean, twenty miles from the

OCEAN WAVES.

Island of Mull, and a like distance from that of Colonsay. Skerryvore is a reef of low rocks, equally in the open ocean, and about twelve miles from the island of Tiree — where the families of the lightkeepers live — and about twenty west of Iona.

MOON THEORIES.

WE believe that all nations of people have their moon theories, or superstitious notions, and yet there are none more silly than the cherished ideas of our own civilized people, who believe that the animal and vegetable kingdoms are under its control; that the elements are controlled by its changes; indeed, that the soil yields or refuses to yield according as the seeds are given it in the old or new of the moon.

The American Indian looks to the moon for signs of weather. He believes that the good spirit makes a new moon every month, and as soon as he gets it finished, round and full, he falls asleep, and evil spirits commence eating the moon by gnawing off the side until they have consumed it, then the good spirit awakens and begins making a new one again. The shape of this new moon, or its position, determines the weather for the next two weeks, or half moon.

Among the different tribes of Indians, as well as among civilized people, the theories are in direct opposition. We have heard many a time two men disputing as to the signs, one claiming that when the bowl of the new moon will hold water, it will be dry; another that when the bowl will not hold water it will be dry — both parties having watched the signs for years, declare that they *never* fail. The absurdity is seen at once.

The following from *Blackwood* on this subject is to the point:

"The notion that the moon exerts an influence on the weather is so deeply rooted that, notwithstanding all the attacks which have been made against it, it continues to retain its hold upon us. And yet there never was a popular superstition so utterly without basis as this one. If the moon really did possess any power over the weather, that power could be exercised in one of these ways — by reflection on the sun's rays, by attraction, or by emanation. No other form of action is conceivable. Now, as the brightest light of a full moon is never equal in intensity or quantity to that which is reflected toward us by a white cloud on a summer day, it can scarcely be pretended that the weather is affected by such a cause.

"Laplace calculated that the joint attraction of the sun and moon together could not stir the atmosphere at a quicker rate than five miles a day. As for lunar emanations, not a sign of them has ever been discovered. The idea of an influence being produced by the phases of the moon is therefore based on no recognizable cause whatever. Furthermore, it is now distinctly shown that no variations at all really occur in weather at the moment of the changes of quarter, any more than at any other ordinary time. Since the establishment of meteorological stations all over the earth, it has been proved by millions of observations that there is no simultaneousness whatever between the supposed cause and the supposed effect. The whole story is fancy and superstition which has been handed to us uncontradicted, and which has been accepted as true because our forefathers believed it. The moon exercises no more influence over the weather than herrings do on the government of Switzerland."

CAMPHOR MANUFACTURE.

DR. A. VON RORETZ, of Otanyama, Japan, states that the only tree which yields the commercial camphor of Japan and Formosa is the *laurus camphoratus*, which the natives call *tsunoki*. It is very widely distributed in Japan, being equally common on the three islands, Niphon, Kinshin and Sikok; but it thrives best in the southern portion of the kingdom, namely, in the provinces of Tosa and Sikok. The sea-coast, with its mild, damp air, agrees with it best; and hence the chief production of camphor is in these provinces.

Camphor is collected the whole year through, but the best results are obtained in winter. When the camphor collectors find a spot with several camphor trees in the vicinity, they migrate thither, build a hut to live in, and construct a furnace for making the crude camphor. When that place is exhausted the hut is torn down and carried to another place.

The method observed in obtaining camphor is very simple. The workmen select a tree, and with a hollow-ground, short-handled instrument begin to chop off regular chips. As soon as the huge tree falls, the trunk, large roots and branches are chopped up in the same way, and the chips carried to the furnace in baskets. The furnaces are mostly built on the side of a hill near a stream of water, and serve for the wet distillation of the chips.

The furnace is of very simple construction. A small circular foundation is built of stone, and upon this is placed a shallow iron pan, two feet in diameter, covered with a perforated cover, luted on with clay. This cover forms the bottom of a cylindrical vessel forty inches high, and tapering to eighteen inches at the top. Near the bottom of this vessel is a square opening which can be tightly closed with a board. The whole vessel is covered with a thick coating of clay, held in place by strips of bamboo. The cover of this vessel, which is also luted on with clay, has an opening, closed with a plug. Passing through the side of the vessel near the top is a bamboo tube leading to the condenser. This condenser is merely a quadrangular box, open below and divided up by four partitions into five compartments communicating with each other. The open side of this box dips into water and is kept cool by water drizzling over it.

The manipulations in the preparation of the camphor are as follows: The cylindrical vessel is filled, after removing the cover, with chips of camphor-wood; the lid is then luted on, and a definite quantity of water poured in through the hole, which moistens the chips and collects in the pan. It is now heated gently for twelve hours, a small fire being kept up as soon as the water in the pan begins to boil. The ascending vapors passing through the chips carry off all the camphor and oil in the wood, and both are deposited on the surface of the water in the condenser. At the end of twelve hours the exhausted chips are removed through the square hole, and fresh chips and fresh water put in. At the expiration of twenty-four hours the process is interrupted, the whole apparatus cleaned, and the camphor collected and packed in barrels. Here it is very lightly pressed; and the oil, which amounts to at least twenty-five per cent, and is as clear as water, is poured off from the solid camphor, and both products are sent to market. At certain places the crude camphor is again pressed somewhat harder, when quite a good deal more oil runs through the crevices in the vessels. The tolerably dry product is sent mostly to Osaka, the chief export town for this important article of commerce.

The camphor oil, called by the Japanese *shono abura*, is used by very poor people only as an illuminating oil; and in spite of its strong smell and smoke it is burned in open lamps. Perfectly pure camphor is not exported, but the crude country product is first freed from the still adherent oil by further distillation in Europe. The exhausted chips are dried on a scaffold by the side of the furnace, and are then used as fuel.

CLOVES AND PEPPER.

THE clove tree belongs to the family of myrtles. Its small lanceolate evergreen leaves resemble those of the laurel, and the flowers grow in bunches at the extremity of the limbs. They first appear at the beginning of the rainy season; they are in the form of long greenish buds, from the ends of which the expanded corolla shows a delicate peach-blossom color. When the corollas begin to fade the calyx turns yellow, then red; the calyces, with their forming seeds, are at this time plucked from the tree, and after drying in the sun, become the cloves of commerce. If the cloves are not gathered just at this time the seed enlarges, the calyx expands, and much of the pungent properties of the clove is lost. The whole tree is aromatic, and the footstalks of the leaves are nearly as odorous as the flowers.

As an ornamental tree the clove is unrivaled. Their noble height, their beautiful form, their luxuriant foliage and spicy fragrance conspire to make them "a joy forever."

It requires a favorable soil and climate to develop the oil and resinous qualities peculiar to this tree. In the larger islands of eastern Asia, and in Cochin-China, it has little flavor. In the Moluccas the clove comes to perfection without cultivation. It is planted in Zanzibar, Cayenne, Bourbon and Trinidad; but from Amboyna comes the best quality, and in quantity ranging up among the million pounds.

Pepper, although not so costly as cloves, is of greater commercial value because the consumption is immense. The pepper-vine supports itself by twining around poles placed for it, or, as in many plantations, it is placed near the mango and other straight trees, the trunks of which it festoons with elegant bunches of fruit. The pepper leaf is large and bright green in color, and resembles the ivy. It flowers in June after the rains begin. The greenish white blossoms are followed by pungent fruit that grow in clusters like grapes.

Pepper grows on the Malabar coast in Sumatra, Borneo, Java and Singapore; and its cultivation has been introduced into Cayenne and the West Indies. The black and white varieties are the product of the same plant, the latter being naturally bleached while lying on the ground, or artificially prepared, which may add to its commercial value, but detracts from the strength and flavor of the spice.

Of later years, in the mania for adulteration, the ground pepper is too often mixed with other substances unpalatable if properly analyzed; and it would be preferable, if practicable, to purchase the round peppercorns and reduce them to flour by pounding in a mortar. Some such method ought to be revived whereby to prepare both coffee and spices, for by no other means can we be sure of obtaining the genuine articles.

THE SACRED IBIS.

THERE are several species of the ibis family, all peculiar, and some of them particularly noted for their beauty of plumage. The Sacred Ibis, illustrated on the opposite page, has a history reaching far back into the early ages. Although not as handsome as some other species, in Egypt it was at one time held sacred by the people, and with the crocodile, bull and cat, was reared in the holy temple with a degree of respect bordering on adoration. When dead, it was embalmed, and with great and foolish honors consecrated to the catacombs. It was also depicted in hieroglyphics, or picture-writing, on the walls of the temples and tombs, as playing a conspicuous part in the religious ceremonies.

E.JAHRHARDT sc.

THE SACRED IBIS.

It is thought by some that the Egyptians held the bird in such reverence on account of its coming and going with the rise and fall of the river Nile. The ibis, being of migratory habits, visited Egypt just before the overflow of the river, as plenty of food can be had at high water. This coming was not attributed to the instinct of the bird directing it, but to a power it held over the waters. They believed that the ibis came and made the inundations which the people hailed with joy, as upon this overflow depended the prosperity of the country through the products of the soil.

The plumage of the sacred ibis is white, with a rich luster, excepting the feathers at the farther part of the back, which are a glossy black, growing out long and hanging gracefully over the ends of the wings and tail. These contrast beautifully with the others. The head and neck are entirely destitute of feathers, have a black, leathery look, the skin lying in uneven wrinkles or folds. Its beak is so long and so large that the people of lower Egypt call the bird "Father Sickle Bill." This bird being a grallatory bird, that is, a wader in the water, its legs are long, something like those of the crane, heron and stork.

The ibis is very indolent, and does not appear to care particularly for company. It may be seen sitting for a long time on a high branch of some tree, or moving leisurely along the bank of a stream when in quest of food; seldom can any great number be found congregated together. Its food is chiefly shell animals, such as are found both upon land and in the water, but it eats insects, worms and small reptiles, when the former cannot be obtained. On the wing it is quite powerful, and will go a long distance without rest. A flock in flight moves something as the wild geese of this country do, and keep up a peculiar cry, as do the geese. It does not breed in Egypt, but goes into the interior of Africa to raise its young.

In the warmer parts of America, and especially in

Florida and Mexico, there is a species of this bird called the glossy ibis. The plumage is a dark brown, glossed with purple and green. The head and neck dark chocolate, legs and toes green. Its habits are very much the same as those of the first mentioned, and being also an inhabitant of Africa, it received honors from the Egyptians while alive, and sometimes after death was embalmed in the sacred tombs. The species, we believe, is also found in England and the West Indies. Its body is about twenty-two inches long.

The most peculiar of this family of birds is the species found only in Australia, called the straw-necked ibis, deriving its name from the long, delicate and fringe-like feathers which hang down from the front side of the neck and throat. These feather-shafts are said to closely resemble small yellow straws, and afford a pretty contrast with the glossy green of the breast and wings and the pure white of the upper portion of the neck. It is very graceful in its movements, passing over the ground in a stately manner, and, unlike the sacred ibis, is of social habits. When feeding they pack closely together and keep in constant motion, their bills and tails making a very singular appearance, showing many brilliant colors as they change from the shadow to sunlight in their motion

TREELESS JUDEA.

THE only trees one meets are the olives, which, however, are by no means plentiful in Judea, and mostly old and stunted-looking. In Samaria we saw several considerable plantations of them, but yet that country is also sadly deficient of trees. Where now is the oak tree on which Absalom hung by his bushy locks? There is, I believe, only one remaining sufficiently large for this; and yet we read that the "Wood of Ephraim," where he was defeated, destroyed more men than did the sword. And where is the sycamore tree upon which Zaccheus climbed? I doubt if there be one such within many miles; and yet we know that Jericho was once richly clothed with trees and verdure, and called the "City of Palms." Indeed, that Palestine generally was once extremely fertile, and rich in woods and verdure, is evident from the meaning of many of the scriptural proper names. There is along almost every little water-course a number of what are called trees, but they are generally willows or mere copses of brush-wood. A tree of any description, of sufficient size to make an ordinary beam for building purposes, is quite a rarity — such are only to be found miles apart. The vine, so much alluded to in the Bible, is somewhat rarely seen; but that it was extensively grown is evident by the traces of terraces upon the steepest hills still abundantly visible. Then, as to the flowers — "The Rose of Sharon" and the "Lily of the Valley" cannot be found. There are many wild-flowers certainly, but generally they grow out of a "dry ground," and have, with very good blossoms, almost a green foliage. "Thorns and briers" are abundant, but very little foliage also, and seem useful only for burning. The fig-trees, even, are few and far between, and the orange, apricot and almond still more so. The fields are not inclosed, except in some rare cases, where a wise husbandman has gathered the loose stones into piles around his border. Hedges are rare, but when seen they are generally formed of large cacti covered with dust, and having in the twilight a somewhat weird look. Cultivated lands in Judea are very rare, and even in Samaria are much covered with stones, making plowing, with the miserable piece of crooked wood, a very superficial operation. We felt surprised and ashamed oftener than once to see our dragoman (who frequently rode considerably in advance) lead his followers right through a field of growing corn, without the slightest compunction, or any consideration for the husbandman, merely to save a few minutes' time in going to see some object or reach some desired path. The inhabitants seem so accustomed to submission to Turkish oppression that no opposition was offered.

THE MAN OF LITERATURE.

CLOSELY allied with the pleasures of art are those of literature, and these perhaps we might, if anywhere, have expected to find an exemption from that law which has stamped on every unsanctified enjoyment the mark of vanity and vexation of spirit. "If to know wisdom," says a popular living writer "were to practice it; if fame brought true dignity and peace of mind; if happiness consisted in surrounding the imagination with ideal beauty, a literary life would be the most enviable which this world affords. But the truth is far otherwise. Look at the biography of authors! Except the Newgate Calendar, it is the most sickening chapter in the history of man." As one of the most striking instances of the mirage of literature in modern times — as a convincing evidence of the inefficacy of the highest genius to secure permanent happiness to its possessor — we select, as our type, Sir Walter Scott, the man of literature.

All influences which could promise happiness or success were crowded around this remarkable man. His professional pursuits furnished him with ample leisure, and an income bordering on affluence. His natural disposition, which was singularly amiable and generous, and accompanied by a chivalrous sense of honor, procured him the attachment of numerous friends. He enjoyed, too, in a remarkable degree, the sweets of a happy home. Thus, on grounds entirely independent of his literary powers, he was in possession of many of the elements of worldly comfort. In addition, however, to the blessings we have enumerated, he was gifted with a genius of the highest order. Much as the Christian must deplore the misapplication, in many respects, of that genius, he must acknowledge the appropriateness of the eulogium:

> "Brother of Homer, and of him
> Who struck the lyre by Avon's stream,
> Time shall through many a cycle be,
> Ere he shall see a fourth like thee."

Never, perhaps, in any period of the world's history, did literary talent receive a homage so universal as that of Scott. His reputation was co-extensive, not only with the English language, but with the boundaries of civilization. It has been the lot of many meritorious authors to be unable to procure a profitable return for their writings. In one year, however, Scott's productions yielded him the enormous revenue of $75,000. Other writers have been condemned to wait a lifetime before they saw their works approved; but Scott's sprang into popularity the first day they issued from the press, and procured their author an admiration that was almost idolatrous. The king conferred on him a baronetcy, accompanying that dignity with special marks of royal favor. When he traveled abroad, his appearance created an enthusiasm, and attracted a crowd of spectators, more like that which attends the passage of a monarch than the movements of a private individual. "If his carriage," says his biographer, describing Scott's visit to Ireland, "was recognized, the street was sure to be crowded before he came out again, so as to make his departure as slow as a procession. When he entered a street, the watchword was passed down like lightning on both sides, and the shopkeepers and their wives stood bowing all the way down; while the mob and boys huzzaed as at the chariot-wheels of a conqueror."

All the good things, as they are termed, of this life were in Scott's possession. His mansion at Abbotsford realized the highest conception of a poetical imagination. "It seems," says one who visited it, "like a poem in stone." "This house," said another distinguished writer, "is like places we dream about." The company which crowded around the man of genius was no less wonderful. The highest nobleman felt honored in being allowed to take a place at his board, around which were collected from every part of the kingdom persons eminent in the various walks of life. Each day produced some novelty. Now a traveler recounted the wonders he had witnessed in foreign lands. Now a philosopher, like Sir Humphrey Davy, detailed recent discoveries in science. Now a poet, or a painter, gave animation to the conversation by his genius. All sources of intellectual enjoyment were crowded together. It was worldly pleasure in its most concentrated form; and well might one of the visitors exclaim: "Surely Sir Walter Scott is, or ought to be, a happy man!" And yet all this was but the mirage. Feelingly does one, who was a witness of the pleasures of this man of genius in his palmiest days, exclaim: "Death has laid a heavy hand on that happy circle. Bright eyes long since closed in dust, gay voices forever silenced, seem to haunt me as I write." A shock of commercial adversity ruined Sir Walter Scott, and dispersed forever the brilliant assemblies which had gathered around his board. The death of one who was dearest to him followed close upon this blow. What consolation could literature then afford him in the hour of trial? Let Sir Walter's own touching words reply: "When I think," he writes, at a time when leaving Abbotsford apparently forever, "when I think what this place now is, with what it has been not long ago, I think my heart will break. Lonely, aged, deprived of all my family, I am an impoverished and an embarrassed man." At another time he writes: "Death has closed the dark avenue of love and friendship. I look at them as through the grated door of a burial-place, filled with monuments of those who once were dear to me, and with no other wish than that it may open for me at no distant period. Not long after, he writes in the same strain: "Some new object of complaint comes every moment. Sicknesses come thicker and thicker; friends are fewer and fewer. The recollection of youth, health and powers of activity, neither improved nor enjoyed, is a poor strain of comfort. The best is, the long halt will arrive at length, and close all." Such was the confession of one who had drunk so largely of the world's cup of enjoyment. Oh, how emphatically does it warn those whose hearts are still set upon similar vanities!

The closing scene at last came, and is not less touching than the preceding passages. A most honorable attempt to pay off his creditors had, by overtaxing his energies, brought on an incurable disease. Sir Walter requested, we are told, to be wheeled to his desk. His daughter put his pen into his hand, but his fingers refused to do their office. Silent tears rolled down his cheeks. "Take me back to my own room," he said. "There is no rest for Sir Walter but in his grave." A few days afterward he died. In such gloomy clouds did the sun of the man of literature set. Otway died of starvation; Voltaire, in the height of his literary glory, wished that he had never been born; but none of these instances proclaim so touchingly as the career of Sir Walter Scott that the highest genius, when not sanctified by being devoted to the glory of God, is, in its results, illusive as the mirage.

THE MAN OF WIT AND HUMOR.

IT may be thought that they who promote mirth so much in others, and who treat life as if it were a jest, have themselves found out the true secret of enjoyment. Very different, however, is the result. There is a mirth in the midst of which the heart is sad, and a laughter the end whereof is heaviness. Not that there is anything sinful in mirth; not that it is not a quality which, when rightly directed, may be turned to useful purposes; but that when unsanctified, it is, as a source of happiness, a delusion and a mirage. Cervantes, at a time when all Spain was laughing at the humorous flights of his pen, was overwhelmed with a deep cloud of melancholy. Moliere, the first of French comic writers, carried into the domestic circle a sadness which the greatest worldly prosperity could never dispel. Samuel Foote, a noted wit of the last century, died of a broken heart. D'Israeli mentions, that one morning, meeting in a bookseller's shop a squalid and wretched-looking man, the very picture of misery, he was astonished to learn that he was a person who was amusing the metropolis by his humorous effusions. The anecdote is well known of the physician recommending a man, who was pining under melancholy, to attend, as a means of cure, the performances of a noted comic actor, and of being informed that his patient was the actor in question — himself wretched, while amusing others. Captain Morris, a witty writer of considerable reputation at the commencement of the present century, when aged, deserted, and well-nigh impoverished, described in the following lines the little satisfaction which the retrospect of his life of folly could afford him: —

> "My friends of youth, manhood, and age,
> At length are all laid in the ground;
> A unit I stand on life's stage,
> With nothing but vacancy round.
> I wander bewildered and lost,
> Without impulse or interest in view,
> And all hope of my heart is, at most,
> Soon to bid this cold desert adieu."

As one of the most striking examples in modern times of the unsatisfactory nature of a life of frivolity, we select Theodore Hook, *The Man of Wit and Humor*.

He was the son of a musical composer of considerable eminence in his day. He was, by death, early deprived of the training of a mother, a circumstance to which much of the unhappiness of his future career may be attributed. His father, returning home one evening, was astonished at his son, then a mere child, producing two ballads which, with appropriate music, he had himself composed; the one plaintive, the other humorous. The prognostics of future distinction thus afforded were verified by the event. At the age of sixteen, a time when other youths are just leaving school, he was, from his powers of dramatic composition, in the receipt of a considerable income, and enjoying great popularity.

His name was blazoned as a youthful genius in the newspapers; his portrait was taken, and he had free admission to the places of public amusement. Many a young man in the present day would have envied his position as containing all that was desirable! Life lay before him like a smooth ocean; and, intoxicated by success, he launched his bark fearlessly upon it. Youth stood at the prow, mirth trimmed the sails, folly took the helm, while the pennon which streamed in the air bore the words "Rejoice, O young man, in thy youth! let thy heart cheer thee in the days of thy youth, and walk in the ways of thine heart, and in the sight of thine eyes."

At this time a taste for practical joking had seized young men. To pull off knockers and bell-handles, to carry away tradesmen's signs, and to overturn the boxes of sleeping watchmen, were considered the marks of a generous and manly spirit. Hook plunged into amusements, and kept a private museum containing abstracted bells, knockers and sign-boards. We feel some scruple in making allusion to such disgraceful follies; but it is necessary, for our illustration, that the gay as well as the grave side of the picture should be shown. On one occasion Hook's friend pointed out to him, as an appropriate specimen of natural history for his museum, a new gilt eagle of large dimensions, which had been erected over a grocer's shop. A few weeks afterward, the same friend happening to be dining with Hook, the latter, toward the close of the entertainment, ordered "the game to be served up." Immediately, to the astonishment of the visitor, the servant entered the room, staggering under the burden of a dish of unusual size. On uncovering it there was produced the identical eagle which Hook, as a practical joke, had contrived to carry off. Such were the contemptible frivolities in which the man of humor wasted his youthful prime.

Among other accomplishments for which he was distinguished, was a remarkable power of producing extempore poetry. At a dinner party he would, without premeditation, compose a verse on every person in the room, full of point and wit, and with true rhyme. Sheridan, the orator, who was present upon one of these occasions, declared that he could not have imagined such a talent possible had he not witnessed the exhibition of it.

So confident was Hook in his powers of humor, that, passing with a friend a house in which a party was assembling for dinner, he undertook, although quite unacquainted with the owner of the house, or any of the guests, to join them, and instructed his friend to call for him at ten o'clock. Knocking at the door accordingly, he gave his hat confidently to the servant, and was ushered upstairs. Entering the drawing-room he affected to have for the first time discovered his mistake, and poured out such sallies of wit that, as he anticipated, the host, although ignorant even of his name, pressed him to stay to dinner. When his friend Mr. Terry called, ignorant whether he should find him there or in the neighboring watch-house, he was astonished, on being shown into the drawing-room, to see the man of humor seated at the pianoforte, delivering some extempore poetry, which, upon perceiving the entrance of his friend, he wound up with the following stanza:

"I'm very much pleased with your fare,
  Your cellar's as good as your cook;
My friend's Mr. Terry the player,
  And I'm Mr. Theodore Hook."

The fame of the man of wit reached even royalty itself. The prince regent was so fascinated with him that he appointed him treasurer to the island of the Mauritius, with a salary of £2,000 a year. He here gave himself up to every enjoyment. "This island," he wrote home to his friends, "is fairyland. The mildness of the air, the clearness of the atmosphere, the liveliness of the place itself, all combine to render it fascinating. Every hour seems happier than the last." Here, then, was Hook at the pinnacle of his glory. Rich, popular, witty, and full of friends, he had surely found the secret of happiness! No; he had only followed the mirage.

Business and pleasure, in the worldly sense of the latter term, are rarely compatible. A deficiency of £12,000, arising not from fraud but from gross carelessness, was found in the treasury. He was suddenly arrested in a ball-room, and sent home a prisoner for debt to England, stripped of all his honors, and penniless. Happy would it have been for him had this blow awakened him from his dream of folly; but alas! as one delusion was dissipated another took its place. By his pen he soon achieved literary eminence and an income of £4,000 a year. Seated at the tables of the great, he became again, from his wit and humor, the life of every party. His versatile genius sparkled more brilliantly than ever, and he was the admired of all admirers. In the midst of his gaiety, however, he had an aching heart. From the brilliant saloon he would retire to his lonely apartment; and there, with jaded spirits, sit down to write, for his bread, some work of humor, racking, as has been well observed, his imagination for mirth with anguish at his heart. "We may venture," says one who appears to have known him intimately, "we may venture to supply by way of specimen a sketch, by no means overcharged, of one of those restless life-exhausting days in which the seemingly iron energies of Hook were prematurely consumed. A late breakfast — his spirits jaded by the exertions of yesterday, and further depressed by some pecuniary difficulty — large arrears of literary toil to be made up — the meal to be sent away untasted — every power of his mind forced and strained for the next four or five hours upon the subject that happens to be in hand — then a rapid drive to town, and a visit first to one club, where, the center of an admiring circle, his intellectual faculties are again on the stretch, and again aroused and sustained by artificial means — the same thing repeated at a second club — a ballot or a general meeting at a third — a chop in the committee-room, and then a tumbler of brandy-and-water or two; and, we fear, the catalogue would not close here. Off next to take his place at some lordly banquet, where the fire of wit is to be again stirred into a blaze, and fed by fresh supplies of potent stimulants. Lady A. has never heard one of his delightful extempores; the pianoforte is at hand — fresh and more vigorous efforts of fancy, memory and application are called for; all the wondrous machinery of the brain taxed and strained to the very utmost; smiles and applause reward the exertion, and perhaps one more song is craved as a special favor. He retires at last; but not to rest — not to home. Half an hour at Crockford's is proposed by some gay companion as they quit together. We need not continue the picture. The half-hour is quadrupled, and the excitement of the preceding part of the evening is as nothing to that which now ensues. By the time he reaches home the reaction is complete; and in a state of utter prostration, bodily and mental, he seeks his pillow, to run, perhaps, the same course on the morrow."

Such was the daily life of the man of wit and humor! Hook has left behind him a journal, some extracts from which appeared in the *Quarterly Review* a few years ago. It is a harrowing description of splendid misery — of the life of one who, while in the world's opinion full of enjoyment, was in truth thoroughly wretched. Let a few brief extracts suffice: "To-day I am forcing myself, against my inclination, to write. The old sickness and faintness of heart came over me, and I could not go out. No; it is only to the grave that I must be carried. If my poor children were safe I would not care. Another year now opens upon me with a vast load of debt, and many encumbrances. I am suffering under a constant depression of spirits which no one who sees me in society ever dreams of."

The close was, however, approaching. One day, at a dinner party, all were struck with his ghastly paleness. Turning round to a mirror, he himself exclaimed, "Ah! I see how it is. I look just as I am — done up in mind, in body, and purse." Returning home, he took to his bed. A friend calling on him found him in an undress. "Here you see me," he said. "All my buckling, and padding, and washing dropped for ever; and I a gray-headed old man." A few days afterward he died.

Such was the end of the man of wit and humor. His powers had all been wasted in the service of the world. He had followed mirth and folly as his grand object in life. Oh, how emphatically had they proved to him — only the mirage!

THE DRUIDS.

IN a deep, rocky glen, in a romantic spot near London, England, is found the ruins of one of the Druids' temples, that has for centuries attracted the attention of curious visitors. The Druids were once a powerful priesthood, but they flourished so long ago that all the knowledge we have as to how their temples looked, or how their ceremonies were performed, is furnished by the vaguest traditions, and yet the ruins of their dilapidated stone monuments are strewed over the surface of France and Britain.

Julius Cæsar left the best description of the character and functions of the Druids that we have. He says:

"They attend divine worship, perform public and private sacrifices, and expound matters of religion. A great number of youths gather round them for the sake of education, and enjoy the highest honor in the nation — for nearly all public and private quarrels come under their jurisdiction. They fix rewards and punishments; and should any one, whether a private individual or public man, disobey their decrees, then they exclude him from the sacrifices. Everybody recoils from them, and shuns their society and conversation, lest he should be injured by associating with them.

"All these Druids have one chief, who enjoys the highest authority among them. When he dies, he is succeeded by the member of the order most prominent among the others, if there be any such single individual; if, however, there are several men equally distinguished, the successor is elected by the Druids. Sometimes they even go to war about this supremacy. At a certain time of the year the Druids assemble in a sacred place; to that place are gathered from everywhere all persons that have quarrels, and they abide by their judgments and decrees. It is believed that this institution was invented in Britania, and then transplanted to Gaul.

RUINS OF A DRUIDS' TEMPLE.

"The Druids take no part in warfare; nor do they pay taxes like the rest of the people; they are exempt from military service and from all public burdens. Attracted by such rewards, many come to be instructed by their own choice, while others are sent by their parents. They are reported to learn in the school a great number of verses, so that some remain there twenty years. They think it an unhallowed thing to commit their lore to writing, though in other public and private affairs of life they make use of the Greek alphabet.

"Beyond all things they desire to inspire the belief that men's souls do not perish, but transmigrate from one individual to another; and they hold that people are thereby most strongly urged to bravery, as the fear of death is thus destroyed. Besides, they hold a great many discourses about the stars and their motion, about the size of the world and of various countries, about the nature of things, about the power and might of the immortal gods; and they instruct the youth in these subjects."

* * *

NOTED MEN OF THE PAST.

PHILIP Melancthon was born at Bretheim, February 16, 1497, and died at Witteinberg, Germany, April 19, 1568. He was a man of great classical erudition and associated with Martin Luther. His head was lofty in the coronal region and prominently intellectual. His nature was benevolent and conscientious.

John Wesley, the founder of Armenian Methodism, was born at Epworth, England, June 17, 1703, and died at the age of eighty-eight, March 2, 1791.

Jonathan Edwards, D.D., LL.D., was born at Windsor, Conn., October 5, 1703, and died at Princeton, N. J., March 22, 1748. He was a speculative philosopher and celebrated metaphysician.

Lyman Beecher, D.D., was born at New Haven, Conn., October 12, 1775, and died in Brooklyn, January 10, 1863. He was a Presbyterian clergyman, with a long, broad and high head. He was noted as a philanthropist, a philosopher, a wit, a critic, a debater, and best of all, a just man.

William Channing, D.D., a distinguished preacher of the Unitarian persuasion, was born at Newport, R. I., April 7, 1780; died at Bennington, Vt., October 2, 1842. He was unselfish, unperverted, pure-minded and large-hearted. He was spiritual and benevolent, and his face beamed with "good will toward men."

Julius Cæsar, the greatest commander of antiquity, was born July 12, one hundred years before Christ, and suffered assassination by Brutus, March 15, forty-four years before Christ.

Hannibal, an illustrious Carthaginian general, renowned for his successes in Italy against the Romans, born two hundred and forty-seven years before Christ, died in exile, self-poisoned, one hundred and eighty-three years before Christ.

Francisco Pizarro, the conqueror of Peru, born at Truxillo, Spain, about 1471, was assassinated at Lima, Peru, June 26, 1541.

Napoleon Bonaparte, born at Ajaccis, Island of Corsica, February 5, 1768, died in exile at St. Helena, May 5, 1821.

Oliver Cromwell, the "protector" and able English general, was born at Huntington, April 25, 1599, and died September 3, 1659.

Duke of Wellington, celebrated as the conqueror of

OLIVER CROMWELL.

Napoleon, was born in Ireland, June 20, 1760, and died in London, September 18, 1852.

William Darcey, the discoverer of the circulation of the blood, was born in Kent, England, April 1, 1578, and died in London, June 3, 1657. He is the author of several works on physiology which rank high as medical authority.

John Abernethy, the first surgeon who attempted the operation of tying the carotid artery and the external iliac artery, which he performed successfully, was born of Irish parents, in London, in 1765, and died there in 1831.

Sir Astley Cooper, eminent as the most successful practitioner of surgery in England, was born in Norfolk, in 1768, and died in London, in 1841.

Edward Jeuner, the discoverer of vaccination, was born at Berkeley, England, in 1749, and died January 26, 1823. He was thoughtful, kind and sympathetic by nature.

Valentine Mott, was a successful American surgeon. He performed successfully some of the most difficult and dangerous surgical operations. His large brain showed him to be possessed of great courage and self-control. His features were something of the Hebrew type. He was born at Long Island, New York, in 1785, and died in New York city, in 1865.

Archimedes, the most distinguished of ancient mathematicians and engineers, was born at Syracuse, in Sicily, about two hundred and ninety-one years before Christ. He demonstrated the properties of the lever. This inventor of the hydraulic screw said that with his lever power he could lift the whole world if a foundation for its fulcrum and a standing place were obtainable.

John Gutenberg, the inventor of printing by the application of movable wooden types, was born at Sulgelock, near Mentz, Germany, in 1400, and died in 1468. Because of his invention being in advance of his age — he was appreciated like the vanguards of all reforms — and being accused of dealings with the devil, he was persecuted accordingly.

Robert Fulton, an American engineer, was the first successful experimenter in steam navigation. He was born in Pennsylvania, in 1755, and died in New York, in 1815.

George Stephenson comes next as the projector of the railway system and inventor of the locomotive. He had a grand head and a face full of character. He was born at Wylam, England, in 1787, and died in 1848.

L. J. M. Daguerre, inventor of the process of daguerreotyping, was born at Corneille, France, in 1789, and died in 1851. How the artist world should appreciate him, as the author of the incomparable art of making pictures by simple chemicals and sunlight! Had not the age been fairly advanced and enlightened, he would have suffered persecution for practicing *diablerie.*

James Watt, the improver and constructor of the first successful steam engine, was born at Greenade, Scotland, in 1736, and died at Birmingham, in 1819. His thoughtful face had the "I can and I will" written in unmistakable characters upon it.

Sir Richard Arkwright, inventor of the spinning frame, which has revolutionized the industry of the world, was born at Preston, England, 1732; died, 1792.

Americus Vespucci, from whom America received its name, was born in Florence, Italy, 1451, and died on the island of Terceira, 1514.

Sebastian Cabot, the discoverer of the continent of America in 1497, was born at Bristol, England, in 1477, and died seventy years later.

Christopher Columbus was born in Genoa, Italy, 1435, and died at Valladolid, Spain, 1506.

Giovanna Verazzano, who explored the eastern coast of North America, from Labrador to South Carolina, was born in 1490, and is supposed to have been killed by the Indians about 1525.

James Cook, the first circumnavigator of the world, was born in Yorkshire, England, 1728, and was killed by the natives of the Sandwich Islands, 1779.

Henry Hudson, the explorer of the Hudson river and Hudson's Bay, North America, was born about 1555, in England, and was abandoned by a mutinous crew in Hudson's straits, 1610.

Sir John Franklin, the distinguished arctic explorer, was born at Spilsby, England, 1786. He is supposed to have perished on his third expedition, which sailed from England in 1845.

Dr. Elisha Kent Kane, the American arctic explorer, and discoverer of the open polar sea, was born at Philadelphia, 1820, and died at Havana, 1857.

Socrates, the greatest heathen philosopher of antiquity, who maintained the existence of one Supreme Intelligence, was born in Attica, Greece, 470 B.C., and died 400 B.C., in Athens. He died from poison, under the unjust condemnation of the Athenian council.

Aristotle, the founder of the "peripatetic" or walking sect of philosophers, was born at Stagyra, Thrace, 384 B.C., and died at Chaleis, Eubœa, 322 B.C.

Plato, the father of speculative philosophy, was born on the island of Ægina 430 B.C., and died at the age of eighty-one, at Athens, 348 B.C.

Galileo, the demonstrator of the solar system, and the inventor of the telescope, was born at Pisa, 1564, and died at Florence, Italy, 1642.

Francis Bacon, author of the "inductive" method of philosophic investigation, was born at London, 1560; died 1626.

John Locke, one of the most celebrated English philosophers, author of "Essay Concerning the Human Understanding," was born at Wrington, 1632, and died at Oates, in Essex, in 1704.

Sir Isaac Newton, the discoverer of the law of gravitation, and author of the "Principia," was born in Lincolnshire, England, 1742; died 1790.

Adam Smith, the greatest of Scotch moralists, and the projector of industrial freedom, was born at Fifeshire, 1723, and died in Edinburgh, 1790.

Talleyrand, the "prince of diplomatists," was born in Paris, France, 1754; died, 1838. Talleyrand had a strong body, a large brain, and great perceptive faculties.

Metternich, an Austrian prince and statesman, was born in Coblentz, 1773, and died 1859. He controlled the movements of the allied powers in their opposition to Napoleon I. His clearness of intellect, his comprehensiveness and executiveness, placed him at the head of European affairs. He was handsome, with full, expressive eyes, a well formed nose and symmetrical head. With the bland manners of the Frenchman added to Austrian dignity it is not to be wondered at that he was a leader even of crowned heads.

Daniel O'Connell, celebrated as an Irish politician and reformer, was born in Kerry, Ireland, 1775; died in Genoa, 1847.

Demosthenes, the most illustrious of ancient orators, was born in Pœania, near Athens, 385 B.C. He died from poison, taken to avoid falling into the hands of the Macedonians, who tortured their prisoners. His death occurred 322 B.C.

Cicero, a Roman senator and advocate of the highest repute, was born at Arpenium, 106 B.C. He was assassinated by order of Antony, one of the Triumvirate, 43 B.C.

Edmund Burke, one of the most eloquent of British orators, was born in Dublin, 1730; died at Beaconsfield, 1797. His nature, as represented, was sharp and emphatic, and full of the fire of eloquence.

William Pitt, America's advocate in the British Parliament in 1776, was born in Westminster, 1708; died at Hayes, 1778.

George Whitefield, the founder of the Calvinistic Methodists, was born in Gloucester, England, 1714; died in Newburyport, Massachusetts, 1770. He was full of enthusiastic fire, and his words burst from his lips like a volcanic shower. His affections were strong, and he was a man of power.

William Wirt, an able lawyer and writer, was born at Bladensburg, 1772; died at Washington, 1835.

Mirabeau, a noted French political leader, was born at Bignon, near Lens, 1749; died in Paris 1791.

Edmund Kean, unsurpassed in tragedy, was born in London, 1790; died there, 1833.

ECCENTRICITIES OF GREAT MEN.

MOST geniuses and men of great talent have been known for some peculiar habit or striking idiosyncrasy. Napoleon would tremble with fear at the sight of a cat. General Elliott, of Gibraltar fame, was always accompanied by a number of them. Johnson liked to imbibe floods of tea or wine, and yet be none the worse for it. Porson drank everything that came in his way. Visiting once a friend's house, when evening came they desired to fill the lamp, but the bottle was empty. Porson had drank the spirits on the sly, not knowing it was intended for the lamp. Douglas Jerrold could not bear the smell of apples. Cavendish hated women. If he met one of his own female servants by accident in any part of the house, she was instantly dismissed. Garrick was vain almost to the degree of insanity. Rousseau was vain and could write only when dressed as a fop. Bulwer Lytton, it is said, could write best when dressed in a court suit. Marlborough was a miser; mended his own stockings to save paying for it, and would walk home ever so late at night rather than pay for a "chair." Napoleon did his thinking and formed his plans for conquest while pacing in a garden, shrugging his shoulders now and then as if to help and compress thought. When Thiers was engaged in his long and oratorical displays, he always had beside him a supply of rum and coffee. The coffee he got direct from Mocha. Gibson dictated while walking in his room, like Scott and many others. Moliere wrote with his knees near the fire, and Bacon liked to study in a small room, which, he said, helped him to condense his thoughts. George Stephenson used to lie in bed for two or three days, the better to "think out" his plans. It would be better if many people would do this who have much thinking to do, as rest favors abstraction and thought, and those who have not a vigorous circulation find the supply of blood to the brain assisted by a recumbent position.

ISRAEL PUTNAM.

AROUND this revolutionary hero clings a halo of romance, so that almost every school-boy has heard some anecdote of Putnam; yet it will not be uninteresting, we hope, to glance along the history of his life and exploits.

He was born at Salem village, now Danvers, in Massachusetts, on the 17th of January, 1718. His parents were in plain but comfortable circumstances, and he received the common-school education afforded by the ordinary New England town of to-day. He was a sturdy, hardy, independent boy, possessed of a generous, impulsive courage that was prompt to respond to the cry of the defenseless. It is related of him that, visiting Boston in his boyhood, he was so scoffed at and ridiculed for his awkwardness by a boy nearly double his size, that at last his patience yielded to anger, and he administered a flagellation upon the impudent youth that he remembered for the rest of his life.

Before he attained his majority he married a Miss

Pope, of Salem. She bore him ten children, and died just as the colonial troubles were beginning. Soon after his marriage he removed to Pomfret, in Connecticut, and settled upon a tract of wild land which he had purchased. He toiled manfully to subdue the original curse of brush and bramble which encumbered his property, and the rough landscape, conquered by his persevering hand, soon blossomed with the fruitful harvest. He was energetic and of good judgment, and in a short time he was in a prosperous condition.

You have heard of his attacking the she-wolf in her cave, from which daring conflict he returned victorious, and immediately and deservedly became the hero of the community.

When the New England colonies became engaged in the French war, he was one of the first to volunteer his services in the army. He was given a captain's commission, with orders to raise a company. He was soon on his way to Fort Edward with a company of men — the flower of the country — around him. In this position Putnam formed many a daring and dangerous exploit, several times narrowly escaping with his life. After this trouble had died out he returned to Pomfret.

On one occasion, it is told of him, while he was attached to Abercrombie's army, he, with a single companion, found himself in the darkness quite within the French lines. The sentinels fired upon them, and a bullet cut a hole in Putnam's canteen, and fourteen passed through the blanket he wore strapped to his back, while his companion escaped with only a slight wound. It was one morning in February, 1758, a fire broke out in Fort Edward and made considerable progress ere it was discovered. The garrison endeavored to check the flames, without success. Putnam and a detachment of his men crossed the river on the ice as soon as they saw the fire, and reached the fort just as the flames were nearing the magazine. The water-gate was thrown open, and the men formed a line to pass the buckets of water from the river. Putnam mounted to the roof, and as the buckets came up to him he dashed the water upon the flames. This position of imminent danger he held until ordered down by the commander of the fort. He leaped to the ground just as the roof came crashing in. The fire was now within a few feet of the magazine, and an explosion was to be momentarily apprehended. Then the hero dashed between the flames and the magazine, which was already charring with the heat, and poured pailful after pailful upon the smoking lumber, with only the heroic remark: "If we must be blown up, we will all go together." His noble example inspired like courage in those around him, and the fort was saved; but so severely was Putnam burned that he was obliged to remain a month in the hospital.

At another time he was about crossing the Hudson, nine miles below Fort Edward, and when his bateau was about to land he found himself almost precipitated into an Indian ambuscade. There was no chance to save himself but to trust to the mercy of the rapids which were roaring over the rocks below. He unhesitatingly headed his boat in that direction, safely shot down over the seething flood and landed below, causing the Indians to believe that the Great Spirit had him under especial protection, and they abandoned all thoughts of capturing him.

Again and again fearful perils environed him, but he miraculously escaped. After the surrender of Montreal Putnam returned home; but in 1762, Great Britain having declared war with Spain, he, as lieutenant-colonel, accompanied this expedition. He bore himself gallantly through this campaign and returned home with well earned laurels.

Then came the threatened troubles between the Colonies and England. British officers were much surprised that, knowing the forces of England's trained armies so well, he should side with the colonists.

"We will resist," said the hero, "and have the honor of ridding our country of the yoke of tyranny. Our forefathers would not bear this yoke, neither will we."

At this time he was residing at Brooklyn, on the eastern border of Connecticut. On the morning of the 20th of April, 1775, he was plowing in the field preparatory to planting his wheat and corn. Near noon a smoking-hot steed dashed up, while a panting courier informed him of the previous conflicts at Lexington and Concord. Not a moment's hesitation followed. He unyoked his cattle from the plow, and calling to the lad who had been driving them to run for his coat, Putnam dashed for his stable and saddled his fleetest horse. Catching his coat from the boy he leaped upon his steed's back and thundered away toward Cambridge. There, late at night, he reported himself to General Ward. Fierce eloquence and fiery counsel was followed by rapid action in those trying times. It would fill many a page to narrate his deeds of valor.

When the colonists were first driven from Bunker Hill he was beside himself with rage. He tried to rally the men. Seizing the Connecticut flag in one hand, he brandished his sword with the other, and hoarsely shouted to them to rally. "Make a stand! make a stand! One more shot in God's name, give them one more!" he pleaded; but the panic-stricken men continued their flight; only he rallied a few, and with them fortified Prospect Hill. Two days after that battle Putnam was appointed one of the four major-generals of the continental army.

Many a disaster to the undisciplined troops was prevented by the invincible energy of this flinty hero. In forced marches, during retreats, his ever-watchful eyes guarded and guided the too often demoralized troops. For sound, far-reaching judgment, for rapidity of action and heroic valor, Israel Putnam was second only to George Washington. In active service until he was seized with paralysis in 1779, he was then obliged to retire to private life, where he enjoyed peaceful quiet for eleven years. He died May 29, 1790.

Only the most ardent temperament, added to the most appreciative mind, can properly value the services of soldier-martyrs, who cut themselves adrift from all the privileges of home enjoyments or luxuries, and warm attachments, to meet hardships, exposures, wounds, and perhaps death, to secure our birthright — Liberty. Washington Irving pays this just and eloquent tribute to the memory of this noble benefactor of our country:

"A yeoman warrior — a patriot brave and generous; forgetful of self in time of danger; ready to serve his fellow man in any way; to sacrifice official rank to the good of the nation's cause. Pattern for all soldiers, eminently a hero, his is one of the talismanic names of the Revolution that stirs the patriotic blood like a thrilling trumpet-blast. Gather up such names as the precious jewels of our history; garner them as the nation's treasures, and hold them immaculate from the inroads of time and decay."

THE TEMPLE OF THE SUN.

BAALBEC (the Baalath of Scripture), a city of the Syrian Province of the Roman world, was among the first in dignity, splendor and wealth, and a city of great size and magnificence, but on the overthrow of the empire became, together with the surrounding country, waste and desolate.

At the commencement of the preceding century a colony of Turks settled among the ruins of Baalbec, and a small town arose, numbering four to five thousand inhabitants; but its life was short. It was invaded by plundering Arab tribes, and at present but a cluster of miserable hovels remains, and these are half hidden by the huge fragments of the majestic structures of old, the shelter of predatory Bedouins, who pasture their flocks in the sanctuaries of the temples, and make the place a horror to tourists.

Baalbec is seldom mentioned by ancient authors. Macrobius speaks of it as the "City of the Sun"; this term corresponds with the vale of Baal; for Baal is the name of the Assyrian god of the sun. The date of its origin is lost in remote antiquity. Some ascribe it to Solomon, as it is thought to answer to the account given of the "House of the forest of Lebanon." It is an historical fact that it attained the zenith of its prosperity under the emperors of Rome, and at that period most of those edifices were probably erected, the ruins of which are now the admiration of travelers.

The Temple of the Sun, one of the wonders of the world, was reached by a majestic flight of marble steps, which stood on an elevated platform, in itself the most gigantic work ever produced by human hands. This huge terrace, nearly two miles in circumference, is composed of regularly hewn blocks of stone, the smallest of which is thirty-four, the largest fifty-four feet in length, eighteen in height, and ten in breadth. These stupendous masses are so accurately and firmly joined that, after almost two thousand years, it is not possible to introduce the blade of a penknife between the united blocks. They were brought from a quarry about two leagues distant, where stones similar to these are still to be seen. Some are finished, and lie at the edge of the quarry, in readiness for conveyance; others repose at the bottom of the pit, in a rough state.

On this wonderful terrace stood the Temple of the Sun. Its entrance was from the east, through a portico of twelve columns of granite, which leads into the first compartment of the temple, a vestibule one hundred and eighty feet in diameter, which is encircled by a series of smaller halls, each in the most beautiful proportions, and decorated in the richest profusion. The forecourt of the temple is of a square form, five hundred and seventy-four feet in length, and three hundred and sixty-eight in breadth; it is covered with grass and shrubs; here are also broken shafts and huge fragments of sculpture. An extensive range of very grand colonnades adjoins this portion of the ruins. It is the Cella or inner temple. Nine of the pillars, all of colossal dimensions, are standing upright; fifty-six of these columns supported the roof of the Cella, which was three hundred and fifty feet long, one hundred and sixty broad, and ninety feet high.

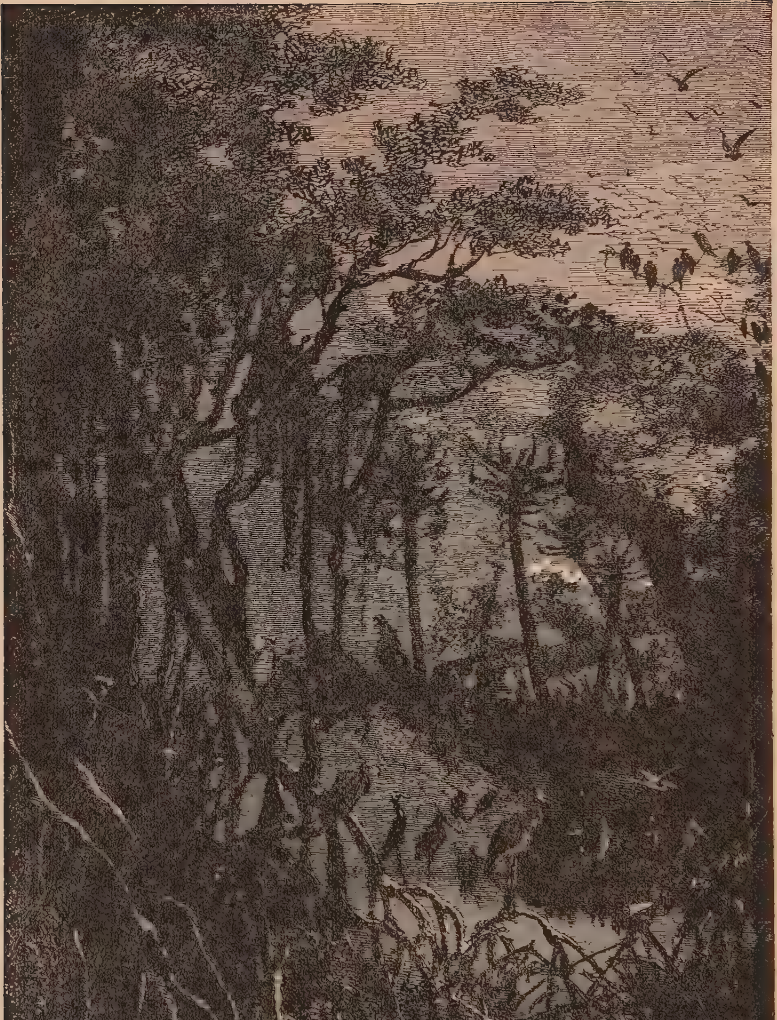
Anything more imposing and grand than this edifice previous to its destruction cannot be conceived by human imagination. Coins frequently have been discovered in the ruins, and mostly bear the stamp of the reigns of the Antonines.

SOUNDS AND SILENCE.

CERTAIN sounds will make a person sad or unhappy, no matter what the present circumstances may be; because they are inseparably connected in the mind by that mysterious something we call "association of ideas," with a condition of mind from which we suffered when the ear was filled by that particular sound, and no matter where or when that sound assails our ears, it recalls instantly the same old feeling.

Dreadful as it sounds to timid, nervous people, *I* love a good, hearty thunderstorm. Sharp lightning, that blinds the eyes and takes the breath, will make me shrink; but the deep thunder is glorious! I love the mellow crashes that mutter and roll away into softer explosions, or lose themselves in the spatter of the rain that tunes itself into a droning lullaby.

I have read somewhere lately that *all* sounds were melodious, if they met the ear at the proper angle, or at a sufficient distance; may be, but I would like to know at what angle, or distance either, it would be necessary to place a pair of cats to make their caterwauling delightful; or whoever thought the braying of a donkey in the least musical?



SCENE IN AN AFRICAN FOREST.

However, I am truly sorry for the people who are deprived of the enjoyment of sound; and I think barbarous nations must entertain the idea that its utter silence is the worst feature of death; hence their custom of making hideous noises, and what they call music, to cheer the departing spirit on its lonely, *silent* journey.

We often read in books of travel of the silence and gloom of the Brazilian and African forests. They are realities, and the impression deepens on a longer acquaintance. The few sounds of birds are of that pensive or mysterious character which intensifies the feeling of solitude rather than imparts a sense of life and cheerfulness. Sometimes, in the midst of stillness, a sudden yell or scream will startle one; this comes from some defenseless fruit-eating animal, which is pounced upon by a tiger-cat or stealthy boa-constrictor. Morning and evening the howling monkeys make a most fearful and harrowing noise, under which it is difficult to keep up one's buoyancy of spirits. The feeling of inhospitable wildness which the forest is calculated to inspire is increased tenfold under the fearful uproar. Often, even in the still hours of midday, a sudden crash will be heard resounding afar through the wilderness, as some great bough or entire tree falls to the ground. There are, besides, many sounds which it is impossible to account for. The writer found the natives generally as much at a loss in this respect as himself.

Sometimes a sound is heard like the clang of an iron bar against a hard, hollow tree, or a piercing cry rends the air; these are not repeated, and the profound silence following is often intense, for every inhabitant of the great wild, being startled by the strange and mysterious sound, hushes its voice and tremblingly listens.

Aquatic animals are mute. A world of radiates, molluscs and fishes, therefore, would be silent. Insects are about the only invertebrates capable of producing sound. Their organs are usually external, while those of higher animals are internal. Insects of rapid flight generally make the most noise, and on all sides they are heard humming, buzzing, booming — often their vibrating wings sounding closely to the ear; and far and near these busy little creatures keep up an incessant noise; but, strange to say, sometimes for a moment every sound is hushed, and one feels relieved when again they commence ticking and singing.

Rarely at other times than in the silent hours of the night, when hunger causes him to come forth from his lair in search of food, does the lion roar. True it is that he is frequently met with during the day, and often, indeed, makes himself heard then; it is, however, seldom before darkness sets in that his real voice — betokening fury as well as power — is sounded forth. Those who have heard only the roaring of such lions as are exhibited in this country cannot form an idea of the same animals' voices when in a state of native freedom; and listened to for the first time a feeling of terror is produced which is quite indescribable.

Occasionally the roar is so loud and tremendous that it actually resembles thunder, this being caused by a peculiar habit which the lion has of laying his head on the ground when he roars, and so making the noise roll, as it were, like a breaker along the earth; while at other times it is not unfrequently mistaken for the sound which accompanies an earthquake.

The instant the lion's terrible voice roars across the plains, now and then for a distance of some miles, the cattle and other animals which are reposing start up with alarm. The leopard and hyena even hold their breath in awe; and then, as it is repeated, they listen with much anxiety to the various echoes which follow, in order that they may make out, if possible, the precise whereabouts of their enemy. Fortunately, possessing a powerful sense of smell, they are generally able to judge, even while the lion is some distance off, whether he is approaching or not; and if they find out that he is making his way toward them, they at first become fearful and tremulous, and then, as a rule, unless secured in an inclosure from which they cannot escape, they speedily fly in all directions — not unfrequently into the very danger which they intended to avoid. Even the most light-footed antelope makes a pattering sound on the dry sand, especially when rushing away in a fright. The lion hears all the animals, and even hears where they stop, which he would not be able to do if he had not first frightened them out of their hiding-places.

Then, when he has made quite sure, he creeps stealthily along from bush to bush, and thicket to thicket, until he is upon his prey; then he utters his fearful roar again, and makes his still more terrible spring. No fear that they will hear him until he wishes to be heard.

His paw is provided with such well-stuffed cushions that he makes no sound as he creeps along. Another use of this soft cushion is that, if the lion should miss his spring, and come down on the ground instead, the fall would not injure his spine as it would otherwise do; for the lion always seizes his prey by a spring, and he can spring a distance of from fifteen to twenty feet. When in anger or eager after his prey, the mane of the lion is raised and standing out from the head, giving him a very terrible and majestic look. Gordon Cumming says of him: "There is something so noble and imposing in the presence of the lion, when seen walking with dignified self-possession, free and undaunted, on his native soil, that no description can convey an idea of his striking appearance. The lion is exquisitely formed by nature for the predatory habits which he is destined to pursue. Combining, in comparatively small compass, the qualities of power and agility, he is enabled, by means of the powerful machinery with which nature has gifted him, easily to overcome and destroy almost every beast of the forest, however superior to him in weight and in stature."

It is a somewhat remarkable circumstance that the lion's roar very much resembles the loud cry of the ostrich, a bird which, like the lion, is found in great numbers in Africa. So nearly alike are these sounds that even the Hottentots and other natives are frequently deceived by them; and it is not until the roaring has been listened to most attentively for some time that it is possible to distinguish the difference between the one noise and the other. Livingstone said he could distinguish the voices of the ostrich and lion only by knowing that the former roared by day and the latter by night.

The lion's most frequent prey are the various kinds of antelopes, zebras, gnus, and wild cattle; the horse is believed to be specially relished by the "king of beasts."

The elephant, the rhinoceros, the tiger, and the hippopotamus are the only animals which ever resist him singly, but the buffalo sometimes manages to shake it off and trample it under foot before it can make its escape. The giraffe, too, requires wary watching and waiting for a good opportunity, as it feeds among the larger trees, and where the brushwood is not thick. The lion likes to seize the giraffe when it is drinking, then, long as is the giraffe's neck, it has to put its fore feet so wide apart to bring its head near the water that it cannot strike out with its hind feet. If it is not drinking, it receives the lion with a good kick, and sometimes breaks its skull. If the lion, on the contrary, succeeds in his spring, the frightened giraffe sets off running, in hopes of escaping in that way. But the lion holds fast, and has an easy time of it, carried on the giraffe's back; while he rends and tears the poor creature, which at last falls down to the ground, quite worn out, and the lion eats it at his leisure.

During the middle period of the day the tropical forests are filled with animals, courting the grateful shades, silent and resting; and it is only in some deep glade, "afraid to glitter in the noontide beams," that the gambols of a monkey disturb the universal solitude. So soon, however, as the sun declines, and the evening breezes reduce the heat, then the inhabitants of these nurseries of life resume their wonted gambols, and none among them are more conspicuous than the monkey tribe.

The interval of activity for them is brief, however; but a few morning and evening hours of a milder heat are sufficient to satisfy all their wants; the blaze of a vertical sun, or a short twilight, again obliges them to seek a shelter from its beams, or a place of rest and security from the prowlers whose turn it is now to seek for food.

There are, however, some tribes which are nocturnal in their habits, remaining entirely inactive during the day, coming forth at night, making the forests resound with their yells and howlings. Of the red howler a traveler says: "Nothing can be more dreadful than its cries. While lying in your hammock in these gloomy and immeasurable wilds, you hear him howling at intervals, from eleven o'clock at night till day-break. You would suppose that half the wild beasts of the forest were collected for the work of carnage. Now it is the tremendous roar of the jaguar, as he springs on his prey; now it changes to his terrible, deep-toned growlings, as he is pressed on all sides by superior force; and now you hear his harsh, dying moan beneath a mortal wound."

The parrots usually spend an hour or more in adjusting themselves in their places at night, during which time they keep up a loud and incessant screaming. At length they are quietly seated, when they commence what very closely resembles a musical concert; this they continue about an hour longer. At regular intervals during the night they sing out as if they were keeping watch.

Few animals seek their prey in the daytime; they are then deterred by their fears of man in the inhabited countries, and by the excessive heat of the sun in those extensive forests that lie toward the south, and in which they reign undisputed tyrants. As soon, therefore, as the morning appears, the carnivorous animals retire to their dens, and the elephant, the horse, the deer, and all the hare kinds, those inoffensive tenants of the plain, make their appearance.

But again at nightfall the state of hostility begins; the whole forest echoes to a variety of different howl-

THE WILD CAT AND ITS PREY.

ings. Nothing can be more terrible than an African landscape at the close of evening; the deep-toned roarings of the lion; the shriller yellings of the tiger; the jackal, pursuing by the scent, and barking like a dog; the hyena, with a note peculiarly solitary and dreadful; but, above all, the hissing of the various kinds of serpents that begin their call, and, as I am assured, make a much louder symphony than birds in our groves in a morning. Snakes and lizards have no vocal chords, and can only hiss. Frogs croak, and crocodiles roar by the vibrations of the glottis.

The huge tortoise of the Galapagos islands utters a hoarse, bellowing noise. The vocal apparatus in birds is situated at the lower end of the trachea, where it divides into the two bronchi. It consists mainly of a long drum with a cross-bone, having a vertical membrane attached to its upper edge. Five pairs of muscles (in the songstress) adjust the length of the windpipe to the pitch of the glottis. The various notes are produced by differences in the blast of air, as well as by changes in the tension of their lining membranes, while the range of the notes is commonly within an octave. Birds of the same family have a similar voice. All the parrots have a harsh utterance; geese and ducks quack; crows, magpies and jays caw; while the warblers differ in the quality rather than the kind of note.

Some species possess great compass of voice. The bell-bird can be heard nearly three miles.

The vocal organ in mammals, unlike that in birds, is in the upper part of the larynx. It consists of four cartilages, of which the largest (the thyroid) produces the prominence in the human throat known as Adam's apple, and two elastic bands, called vocal chords, just below the glottis, or upper opening of the windpipe. The various tones are determined by the tension of these chords, which are effected by the raising or lowering of the thyroid prominence. The will cannot influence the contraction of the vocalizing muscles, except in the very act of vocalization.

The vocal sounds produced by mammals may be distinguished in the ordinary voice and cry, and the song. The second is the sound made by the brutes. The whale, porpoise, armadillo, ant-eater, porcupine and giraffe are generally silent. The bat's voice is probably the shrillest sound audible to human ears.

There is little modulation in brute utterance. The opossum purrs ; the sloth and kangaroo moan ; the hog grunts or squalls ; the tapir whistles ; the stag bellows ; and the elephant gives a hoarse noise from its trunk and a deep groan from its throat. All sheep have a guttural voice. All cows low, from the bison to the musk-ox ; all the horses and donkeys neigh ; all the cats mew, from the domestic animal to the lion ; all the bears growl ; all the canine family (fox, wolf and dog) bark, howl and whine. The howling monkeys and gorillas have a large sac or cavity in the throat for resonance, enabling them to utter a powerful sound ; and one of the gibbons has the remarkable power of emitting a complete octave of musical notes.

The human voice, taking the male and female together, has a range of nearly four octaves. Man's power of speech, or the utterance of articulate sounds, is due to his intellectual development, rather than to any structural difference between him and the apes. Song is produced by the glottis — speech by the mouth.

THE BOTTOMLESS PIT.

NEAR the shores of the bay of San Francisco, and not far from the town of Benicia, is a spot called the "bottomless pit." How justly it has been so called will appear by the following account: Some time ago it was determined to build a railroad to skirt the eastern shores of the bay, and at once work was commenced. All went well until this particular spot was reached. Here it was found that the ground was soft and needed filling in. This was done, apparently, satisfactorily, and the work beyond it was proceeded with. One morning, however, it was reported that all the filling in was gone, and so mysteriously as not to leave any trace behind of its whereabouts. There was nothing to do but to fill it in again, and accordingly it was done. Again did morning dawn upon the same soft quagmire that had originally disputed the roadway. Gone were the tons of stone and gravel so laboriously heaped upon the strange spot. Again and again did the same thing happen, until at last it seemed as if human perseverance, together with fabulous amounts of gravel, had accomplished the object of filling up the spot, now come to be known as the bottomless pit. The construction train had already passed over the "pit" many times in safety, and the road employés were almost lulled into a sense of complete security, when one Saturday, upon approaching the place, engineer Sankey noticed that the earth had a depressed appearance. He knew in a moment what that meant; but it was too late to stop the train. There was but one chance, and with a providential presence of mind he saw it — he must cross the spot with all the speed his engine was capable of. At once he grasped the lever and opened wide the valve. Fortunately there was a powerful head of steam on, and with a snort and shudder the good engine gathered all its strength, as if realizing the dreadful necessity, and rushed with terrific speed over the treacherous morass, which was all the while sinking under the flying train. Hardly had the last car reached the firm earth beyond when, as if swallowed into the rapacious maw of some vast monster, silently and unresisting, three hundred feet of track sank out of sight. Having fairly skimmed over the yawning jaws of death, it is no wonder if the rescued men offered up heartfelt thanks for their deliverance. It is hardly probable that any more attempts will be made to fill the bottomless pit; for even if eventually successfully done, there would be few indeed who would voluntarily care to cross it.

ANTIQUITY OF THE BARREL.

FEW inventions have had a wider or more varied usefulness than the barrel; few give such promise of perpetuity. Unique in principle, simple yet singularly perfect in plan and structure, the barrel is little less than a stroke of genius. Who set up the first one? Who first conceived the happy thought of making a vessel tight and strong out of strips of wood bound together with hoops? And when did he live?

No history of inventions, none of the encyclopedias in our great libraries, no historian of human progress, so far as we know, gives any information on the subject, unless we except the Roman author Pliny, who mistakenly attributes the invention to the Gauls, who inhabited the banks of the Po. We say mistakenly, since there is the best of good reasons for believing that the barrel was in use long before the Gauls took possession of their Italian home, perhaps long before the Gauls existed as a people.

The monuments of Egypt furnish proof of the early use of hooped vessels, though no date is given of their invention. In one of the inscriptions copied by Wilkinson may be seen two slaves emptying grain from a wooden vessel made with hoops, while a scribe keeps tally, and a sweeper stands by with a broom to sweep up the scattered kernels. Close by an unfortunate is undergoing punishment by bastinado, for short measure perhaps, or, as Mr. Wilkinson suggests, for petty theft. The measure is barrel-shaped, and precisely like the *kayl* of modern Egypt. It would hold, apparently, about a peck. Unfortunately the age of this inscription is not indicated. Measures of the sort would seem to have been in common use very early in Egypt, though not for the storing of liquids, for which purpose skins and earthen vessels were employed.

At first thought, Egypt would be the last place to look for the invention of hooped vessels, its arid climate making it specially unsuited for their employment. Possibly, however, that may have been the compelling cause of their invention.

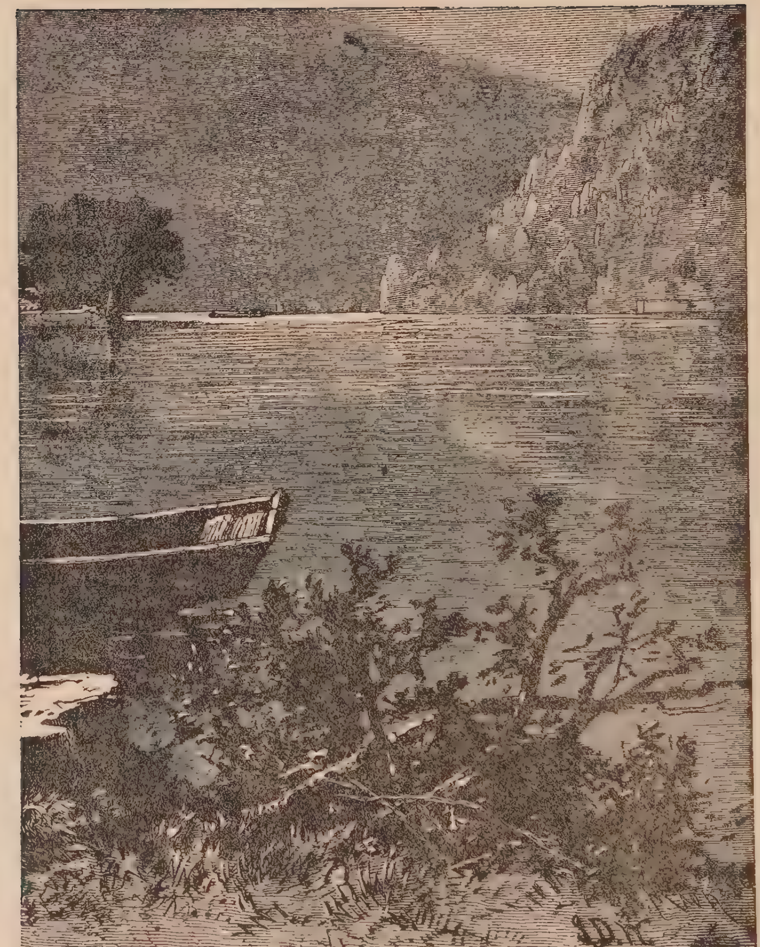
Throughout the East the bamboo is largely used for making hollow vessels, a section of the stem through a node securing a solid bottom, and one between the nodes an open mouth for a natural tub or bucket. In well wooded regions, nothing would be more natural than the employment of hollow tree trunks for the same purpose, or sections of tree stems, hollowed out by fire or otherwise. In drying, such vessels would split and spoil, and it would require no great genius to repair them by means of wythes or wooden bands, the primitive form of the hoop.

If the users of such natural barrels should migrate to a region where timber was scarcer, economy of lumber would be likely to suggest the building of barrels from pieces artificially split, in short, the use of staves, by means of which the primitive cooper would be enabled to make several barrels out of a block that would suffice but for a single dug-out.

But this is speculation merely. It is enough to know for a certainty that the cooper's art, like the potter's, is of extreme antiquity.

ITASCA LAKE.

AMONG the numerous small lakes in northern Minnesota that form the source of the Mississippi river, no one, in point of loveliness, can compare with Itasca. This beautiful body of water is situated in latitude 47° 10′ north, and 95° 54′ west, near the summit of the water-shed between the Red River of the North and the streams flowing to the Gulf of Mexico. The lake, judging



ITASCA LAKE.

from traveling its entire length, is some twelve or fifteen miles in extent, irregular in width, nestled among grandly moulded hills, and bordered by a heavy growth of pine timber. The water of Itasca Lake is as clear as crystal, and usually as placid as the surface of a mirror, abounding in most excellent fish, and in the spring bedecked with innumerable aquatic birds, furnishing any amount of sport for the lovers of the rod and gun.

SWIMMING IN THE SALT LAKE.

THERE are no fish in the great Salt Lake. The only living thing beneath its waters is a worm about a quarter of an inch long. This worm shows up beautifully beneath the lens of a microscope. When a storm arises the worms are driven ashore by thousands, and devoured by the black gulls. We found a pure stream pouring into the lake. It was filled with little chubs and shiners. The fish became frightened, and were driven down the brook into the briny lake. The instant they touched its waters they came to the surface belly upward, and died without a gasp. The water is remarkably buoyant. Eggs and potatoes float upon it like corks. Mr. Rood and myself stripped and went in swimming. I dived into the lake from a long pier, which had been built for the use of a small steamboat that formerly plied upon the waters. The sensation was novel. The water was so salty that my eyes and ears began to smart, but so buoyant that I found no difficulty in floating even when the air was exhausted in my lungs. As I struck out for the beach I felt as light as a feather. In spite of all that I could do my heels would fly out of the water. I found it impossible to stand upon the bottom; the lightness of the water and surging of the waves forced my feet from under me. A person who could not swim might be easily drowned in five feet of water. His head would go down like a lump of lead, while his feet would fly up like a pair of ducks. The water is as clear as the water of Seneca lake; so clear that the bottom can be seen at the depth of twenty feet. When we reached the shore and crawled out on the sand, in the light of the sun, our bodies were quickly coated with salt. We were compelled to go to the little stream from which we had driven the chubs and shiners, and wash off in fresh water before we put on our clothes. Our hair was filled with grains of salt that could not be washed out. The Mormons occasionally visit the lake in droves for the purpose of bathing. Many of them say that their health is improved by leaving the salt upon their body, and dressing without wiping themselves with napkins.

CORAL AND PEARL FISHING.

THE manner in which the Mediterranean fisheries are conducted is to man small boats — coralines they are called — with crews of eight men each. These men are always excellent divers. They take with them a great cross, whose arms are of equal length, and very strong. To each arm is attached a net, shaped like a sack. A stout rope is fastened to the center of the cross, by which it is lowered to the bottom of the sea, with sufficient weight to keep it steady. The diver next descends. The cross he moves about so that the arms scrape the coral from the rocks, and it becomes entangled in the nets. About thirty seconds is the average time in which a diver can do this work. At a given signal he is drawn to the surface of the water, with his cross and coral, by the men in the boat.

The fishery that furnishes us with pearls and the mother-of-pearl is the most perilous of all the submarine pursuits. These two substances are the same in composition. They are formed mainly of carbonate and phosphate of lime. The great difference in value between the two is because the so-called mother-of-pearl is found in several species of shell-fish, and is, therefore, abundant: but pearls are comparatively rare and accidental. Even in the species in which they are most frequently found, twenty or thirty shells are often examined before one can be found of a regular outline and of a certain size.

The pearl oyster which the fishermen call *pintadina*, or "mother of the pearls," resembles the common oyster, but is much larger. It is principally caught in the Strait of Manaar, between the island of Ceylon and the extremity of the Deccan. It is also found on the coast of Japan, the Persian Gulf, the Red Sea, the Gulf of Mexico and the coast of South America. The fisheries in the Strait of Manaar belong to the English. These oyster-beds comprehend several banks, one of which is said to be twenty miles in length. Fishing commences in the month of February and ends in May. Each boat has a crew of twenty men,—half divers, half sailors, besides a master and a pilot.

Each diver grasps, with the toes of his right foot, a rope, to the end of which a stone is attached. The stone helps his descent, and enables him to keep at the bottom of the water. He never dives head foremost, but goes down either in a standing or crouching position. With his left foot he holds his net. In his right hand is the stone-weighted cord. His ears are stopped with cotton, and with his left hand he pinches his nostrils. When he arrives at the bottom he hurriedly picks off all the oysters within his reach, places them in his net, which he hangs about his neck, and when he can remain no longer, at a given signal he is drawn up by his companions in the boat.

A diver never can work at greater depth than eight or nine fathoms. Neither can he remain under water at great depth more than half a minute. There is no truth in the statement that these men sometimes spend a minute or more under this mass of water. The pressure is twofold that of the atmosphere, and no man is capable of so extraordinary a feat. A robust diver will sometimes accomplish fifteen or twenty descents in one morning, but under adverse circumstances will not dive more than four or five times.

Diving soon affects the health of the men. A diver rarely grows old. Many of them contract a frightful disease, which unfits them for work; their sight grows weak; then their eyes become ulcerated, and all their body covered with sores; others are stricken with apoplexy or die of suffocation at the bottom of the sea; some fall victims to the sharks, that are the terror of pearl-fishers. The presence of one of these voracious man-eaters on the fishing-ground will scatter an entire fleet of boats and drive them into port.

GEMS AND PRECIOUS STONES.

THE diamond is the hardest known substance, and one of the most unalterable gems. It is not affected by chemicals, is infusible, only to be consumed by exposure to a long-continued or very high temperature; and these qualities, combined with its rare brilliancy, make it the most valuable of precious stones. It is pure carbon; chemically almost the same as graphite, or plumbago and charcoal; but very different from them in its transparency and luster. It is generally found in octahedral crystals, having highly polished faces; and although possessing some beauty in its natural state, owing to the high luster of the faces, yet it has not a tithe of the splendor exhibited by a well-cut brilliant. The ancients did not know how to cut the extremely hard diamond, and were content to wear it in its natural state, but even thus they prized it highly.

In 1456 Louis Berqueu, a Belgian, brought the art of diamond-cutting to a high state of perfection, and it is now carried on chiefly in Amsterdam by the Jews. Nothing but diamond will cut diamond, and therefore the stones are first roughly shaped by cleaving off slices of the gems and rubbing two stones together. Afterward they are brought to the exact shape required and finely polished by grinding against a very swiftly revolving disc of soft steel, smeared with oil and diamond dust. On this operation of cutting depends the brilliancy and consequent value of the gem; and as diamonds are sold by weight, there is a great tendency to so cut the stone that it may weigh as much as possible. This, however, is a great error, as a stone must be cut in a certain way in order to develop the most perfect luster, and any additional weight inevitably injures the effect of the cutting.

The most common form of cut diamonds is the well known brilliant, familiar to all. Another less common form, but producing a fine effect, is the rose diamond — a flat bottom, surmounted by a faceted pyramid, terminating in a point.

According to their transparency and luster, diamonds are classified into stones of the first water, second water, and refuse stones. To be of the first water a diamond must be absolutely colorless, very lustrous, and perfectly free from flaws. An undecided tint of any color injures its value; and although deep red, green or blue hues may give the stones an exceptional value as fancy specimens, yet in the ordinary market they would be much less esteemed. A yellow tint always depreciates the value; and on this account many of the stones so recently found in South Africa bring very low prices. These African stones, moreover, lack the perfect luster of Brazilian diamonds, and have in consequence commanded far lower prices.

A well cut diamond of the first water is at present worth, in New York, about $50 gold if it weighs half a carat (the carat being four grains troy); if weighing one carat, $175; if two carats, $550. Above this weight the values depend on very delicate shades of difference. One stone of three carats may bring $800, another might be worth $1,000. Above three carats the price is only settled by agreement. A diamond of five carats is a very large stone, and above one hundred carats few are known.

As examples of some of the most celebrated diamonds may be cited the *Koh-i-noor*, one of the English crown jewels, weighing, uncut, 793 carats; and, after twice cutting, 106 $\frac{1}{16}$ carats. It is, perhaps, the finest diamond in the world. The Rajah of Mattam has one of 367 carats. The Great Mogul diamond weighs now 279 $\frac{9}{16}$ carats; uncut 900. The Star of the South, a Brazilian stone, and one of the most beautiful brilliants, weighs 125¼ carats.

Diamonds are found in alluvial deposits, from which they are separated by washing. In Brazil the work is done by slaves, and the fortunate finder of a stone of over seventeen carats receives his freedom and a suit of clothes. Scarcely one in ten thousand is found to weigh so much, and the majority of them weigh but a very small fraction of a carat.

The most celebrated localities in ancient times were Golconda and Borneo; but in 1727 the diggings in Brazil were opened, and yielded so abundantly as to greatly depreciate the value of diamonds, and the dealers tried to make people believe that they were not true diamonds. Lately diamonds have been found in Australia and South Africa, and a few in North Carolina, Virginia, and California; but Brazil furnishes the most abundant supplies and the best gems.

Numerous attempts have been made to produce artificial diamonds, but they have all been in vain. It is even doubtful whether microscopically small crystals have been formed. Diamonds are, however, very well imitated by pastes, which possess all the beauty and fire of the real stones, and flash in our street cars, theaters, and shop windows, quite secure from detection except by a shrewd judge of human nature as well as of stones.

Next in hardness to the diamond come the ruby and sapphire, identical in composition, being both nearly pure alumina, which also constitute the mineral corundum, so useful as a polishing and grinding agent. Emery, too, is only an impure form of alumina.

The ruby of the first water is a deep red, lustrous stone, admired everywhere, and especially in the East. It is found chiefly in the kingdom of Ava, whose sovereign retains the finest rubies as his private property. Cut in a flat table, bordered with small facets, and surrounded by brilliants, it is an exceedingly handsome stone, and a very precious one, nearly approaching the diamond in value. A ruby of one carat is worth about one hundred and fifty dollars in New York, and a ruby of over three carats is actually more valuable than a diamond of equal weight, because much rarer. Rubies are very well imitated by pastes, and not unfrequently very fine garnets are palmed off by unscrupulous dealers as genuine rubies, although the fraud can be readily detected, as garnet is a much softer stone and has different optical properties.

The sapphire differs from the ruby only in its blue color. Occurring more abundantly, and larger, it is of less value, and while a sapphire of one carat is worth one hundred dollars, one of larger size would command a far less price in proportion than a large diamond. Asteriated sapphires and rubies, which when cut show a six-pointed star, have a high value as fancy stones. The sapphire was supposed to have a cooling influence on the wearer, and has long been the badge of the episcopal office. Sapphires come mostly from Ceylon; but inferior rubies and sapphires, of a pale hue and less transparent, are found in this country, especially in North Carolina and Georgia. They are, however, valueless as gems.

THE WORLD'S GOLD.

THE Ural Mountains, Australia and the United States are the most productive sources of gold supply, the first yielding $20,000,000 annually, the second $37,000,000 and the third $35,000,000. Prior to the discovery of the rich mines of the United States the total production was only $68,000,000 per annum.

The fever for gold hunting, which was excited by the finding of the great mines of the Pacific coast, rapidly increased the yearly production, until, in 1850, it reached over $120,000,000, and five or six years later gold bullion was mined to the extent of the enormous sum of nearly $185,000,000. This was the largest yield of any one year, and since, production has gradually fallen away, and seems to have finally reached an equilibrium of about $100,000,000 per annum, nearly all of which is found in the three regions named. Now, if this represented the actual yearly increase in the volume of gold which is used as the basis of the currency of gold-using countries, it might serve, unassisted, as a standard. But the fact is, this production does little more than supply the place of that which disappears from circulation as money, annually, by loss and wear, or metamorphosis into articles of commerce.

A few years ago some English statistician, after a careful investigation, estimated the yearly loss of gold coin to the British treasury was £5,000,000 sterling; and calculating from this basis, the loss to the world must amount to nearly the total production, and therefore little addition to the bulk of gold in the treasuries of all nations can be expected. It is true that new mines may be found,—it is not to be supposed that there are no undiscovered regions rich with auriferous deposits,—but against this are the uncertainties of discovery, with an almost certain decrease of the present production. That there has been a large increase of the stock on hand during the past quarter of a century cannot be denied, but this has been due principally to the remarkable discoveries in the United States, which in a few years doubled the store. Thirty years ago the entire stock of gold coin was only a little more than $3,000,000,000. Now it is $7,500,000,000, but the increase was made during a few years, and the past decade has added little to the stock.

PERILS OF THE AERONAUT.

THE first practical discovery of a means for navigating the air was made in the year 1766, by a man named Cavendish, but not until the year 1783 was the discovery developed to any great extent. In the early part of the last year mentioned two brothers, paper-makers at Lyons, France, named Stephen and Joseph Montgolfier, sent up several balloons inflated with hot air — hydrogen gas not being known then — to the height of two hundred feet. These experiments were looked upon with wonder, and the name Montgalfiere became immortalized,

In October of the same year the first aerial voyage was made by M. Pilatre de Roziers and Marquis d'Arlandes from Paris. They arose to the height of 3,000 feet, and passed entirely over the city, remaining in the air nearly half an hour. This air-ship was seventy feet high, forty-six feet in diameter, and had a capacity of 60,000 feet. It was inflated by hot air produced by burning straw in the basket below.

The shape of Montgolfier's balloon has not been improved upon to the present time. Like the violin, the original form proved to be the best, although hundreds of experiments have been made, and every conceivable shape and size brought into use.

After the successful ascent and voyage over Paris, people became excited and experiments increased rapidly, and the following year two parties made a voyage to the height of 13,000 feet, and reached the earth in safety after remaining in the air two hours. This wonderful success induced other aeronauts to make ventures in further developments of air-ship flights, and led to frequent peril. In 1785 Pilatre de Romaine and a young man named Laine attempted to cross from France to England in a balloon. They had ascended to the altitude of about 3,000 feet when, unfortunately, the ship took fire and suddenly collapsed. The two voyagers were precipitated from the giddy height to the earth, striking upon the rocks off the coast of France, and crushed out of human semblance. The same year Roziers and his brother made a voyage in a Montgalfiere, and when seven hundred feet above the earth their balloon took fire, which cost the adventurers their lives.

As early as 1796 a Mr. Blanchard made an ascent from New York city, and, to add to the interest of the occasion, his wife accompanied him. Afterward the lady became famous as an aeronaut, and lost her life in attempting to achieve more than others had done. In July, 1819, she made an aerial voyage from the Tivoli Garden of Paris, where thousands of people had congregated to witness a grand display of fireworks in the heavens that she had announced would be given. The balloon mounted to the clouds in the darkness of the night, and the multitude witnessed one of the most brilliant spectacles that had ever been beheld. Millions of brilliant stars in varied colors shone and darted, sparkled and vanished to be followed by millions of others. At last a great light was seen, and the word was started, by those who understood what it signified, that the balloon was on fire. Madam Blanchard had, under the excitement of the occasion, been careless in the use of her torch, and the line of gas had taken fire below and flashed to the body of the great vessel. A chill of horror followed the terrible

PERILS OF THE AERONAUT.

words through the densely packed throng, and anxious eyes watched the slow descent of the great fiery object. At last the light went out, and the multitude waited with bated breath until the word came that Madam Blanchard had been picked up mangled and dead from the pavement of one of the streets of Paris.

On the 25th of November, 1802, Olivari made an ascent from Orleans in a paper balloon, strengthened only by strips of cloth. The air-ship was large, and reached a great height, and when scarcely visible to the naked eye, through some unknown means took fire and collapsed. Olivari made a rapid downward plunge, and his mutilated remains were gathered up three miles from the point where he had waved an adieu but a few minutes before.

A gentleman by the name of Mosment made an aerial voyage in a silk balloon in 1806. He started from the city of Lille, France, with high expectations, and his ascent was witnessed by a large concourse of people. The air-ship was large and beautiful in design and finish. It mounted upward majestically, and the lookers-on believed that no disaster could come, as everything had been prepared with the utmost care. The balloon did prove to be as trustworthy as it had been expected, but the unfortunate Mosment, by some accident, fell from the basket when thousands of feet above the earth, and came whirling downward, while the huge vessel darted skyward and sailed proudly away. The ill-fated aeronaut was found half-buried in the sand not far from the city limits.

In the same year Bittorff, notwithstanding the ill luck of Olivari, made an ascent in a paper balloon from Monheim, on the Rhine. He arose above the clouds in triumph, not believing that he was to meet a fate, if possible, even more terrible than that of his ambitious fellow-aeronaut; but it came. The ship took fire and, flaming out from the top, burned away the cords that held the basket. He grasped in terror the frail, unsupporting ropes, and plunged down through the awful depths, and, landing upon the city, had every bone in his body crushed to atoms.

In 1824 a man by the name of Harris went up in a balloon from London, taking as company a young lady of remarkable courage and intelligence. The ship, being fully inflated, ascended rapidly, and reached a great altitude before the aeronaut could control the object. There was a defect in the working of the escape valve at the top, and finally when it was pulled open it could not be closed again. The gas rushed out with terrific force, and the position became more perilous than before. The balloon began to descend, and it was known that every moment would increase the speed of the downward flight. Harris worked at the valve rope until satisfied that there was no hope of closing the cap; then he threw out all of the ballast. This lessened the velocity of the shrunken, swaying ship, but not sufficiently to save the lives of the voyagers. They were nearing the earth still at a rapid rate; both must perish if both clung to the basket. Harris knew this, and in the generousness of his nature he leaped from the over-cumbered craft and met a sudden death, while the lightened balloon became gentle in its motion, and landed the lady with but slight bruises.

In the same year the celebrated English aeronaut, Sadler, was killed while making an ascent. His balloon, sailing low, was driven against a chimney, and the voyager thrown out and killed.

We will not dwell longer upon the painful scenes connected with aerial voyages. The particulars of the disasters which have occurred in this country are familiar to the reader. Prominent among these are the sad fates of Thurston, who made an involuntary ascent from Adrian, Michigan, and fell from the balloon, after becoming exhausted in attempting to sustain himself by clinging to the cords on the side of the monster, and Donaldson and Grimwood, who were swept by storm out over the lake, to eternity, from Chicago, in 1875.

After about 1820 ballooning became very common in all civilized countries. A Mr. Green, between the date mentioned and 1857, made some fourteen hundred ascents. In 1836 he made a happy record in affecting a transit of five hundred miles in eighteen hours — nearly twenty-eight miles per hour.

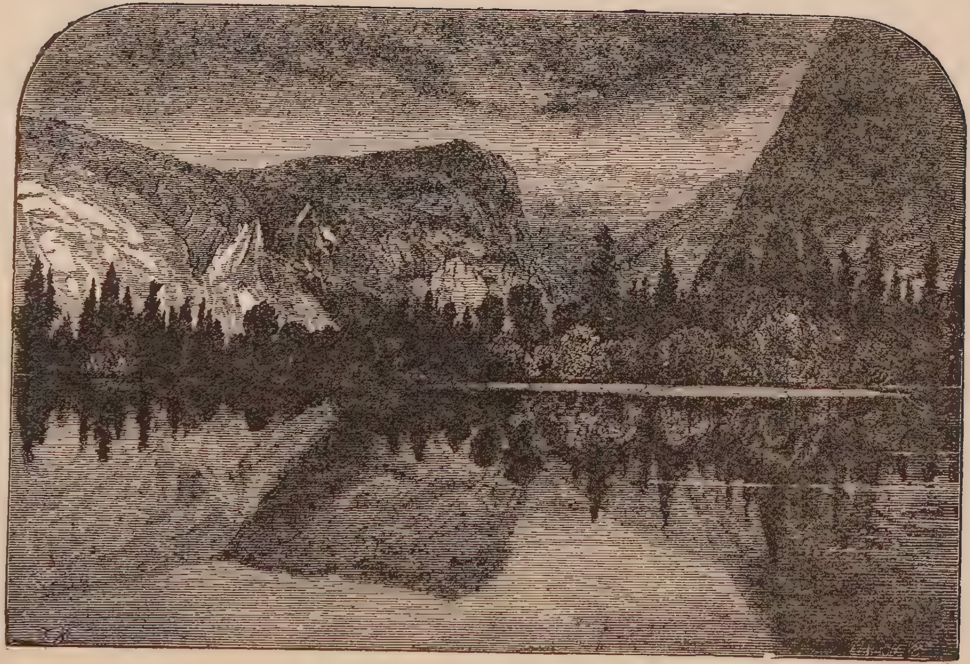
Mr. John Wise, in 1859, took all the glory away from the English aeronaut when he made his celebrated voyage from St. Louis, Mo., to Jefferson county, New York, a distance of eleven hundred and fifty miles, in nineteen hours and fifty minutes, being over fifty-seven miles per hour. But Wise did not hold the palm for speed for any great length of time. In the same year two men named Mountain and Lowe made a voyage of three hundred miles in four hours,— an average of *seventy-five* miles an hour.

As singular as it may appear, the great majority of balloon ascents have not been made in aid of science, but to gratify an ambition for adventure, or for pecuniary gain. In 1862 Messrs. Glaisher and Coxwell, experienced aeronauts, reached the unparalleled height of seven miles from the earth. At that altitude human life can barely be preserved. Both men lost the use of their limbs. Mr. Coxwell, at the time of reaching the highest point, was in the rigging attempting to free the valve rope, which had become entangled; benumbed, he fell back into the car, where he found Glaisher insensible. His hands were no longer under his control, a stupor was rapidly falling upon him, but he yet retained enough of reason to comprehend the situation, and realized that something must be done at once. Clinching the valve rope in his teeth, he dipped his head downward with force enough to give vent to the gas, and the monster air-ship gradually settled to earth again.

Attempts have been made to put the balloon to practical uses, especially in time of war, but as its course is marked by the currents of air which it comes in contact with, the experiments have not proven entirely satisfactory.

MIRROR LAKE.

AMONG the most notable features of the wonderful Yosemite Valley is Mirror Lake, a small body of water, pure as crystal, nestled among the huge mountains, and during the morning hours, even until the god of day has peered over the lofty crests upon its placid surface, the waters give back a reflection of everything along their borders in such perfection of outline and color, that one can scarcely tell where the shore begins. While other scenes around awe into silence, this brings forth expressions of happy admiration.



MIRROR LAKE, YOSEMITE VALLEY, CAL.

THE STORY OF AN INVENTION.

IT may not be generally known that an important invention in connection with the manufacture of carpets originated as follows: An operative weaver, in a large establishment, was engaged in weaving a carpet that in its finished stage would appear as a velvet pile. At that period this description of carpet was woven much in the manner of Brussels, the loops being afterward cut by hand — a slow and costly process. These loops were formed by the insertion of wires of the requisite thickness to form the loop; they were then withdrawn. This weaver — whether by cogitation or the result of a bright thought — came to the conclusion that if these wires were so constructed as, on being withdrawn, to cut the loops, thus instantly completing the formation of the pile, it would be a great saving of labor and time, and a great economy. Taking one of the rods, he changed its form to the required shape, ground a knife-edge upon it, took it to his looms, and inserted it into the web — all the while maintaining strict secrecy — and with some degree of excitement watched its weaving down until the moment of its withdrawal. This came, the rod was drawn out, the loops were cut, and the experiment was a perfect success, the pile being cut with great evenness.

The weaver, with a shrewdness often wanting in inventors, doubled up the rod and hid it away, wove down the line of cut loops upon the roll, then "knocked off," or stopped his loom, and proceeded to the office of the mill, where he demanded to see the principal. The clerk demurred to this, asking if he himself could not do all that was required; but no, the weaver persisted. Then the manager tried, but with the same result; only the principal would suit the weaver. The employer was informed of the operative's persistence in determining to see him; so he at once ordered him to be admitted. This was done, and the weaver stepped into the well-furnished and handsomely carpeted office of the manufacturer. His employer addressed him: "Well, John," (for so we will call him,) "what is it you want?" "Well, maister, I've getten summut you mun hev," replied John. "Wodn't yo like a way ut makkin t' loom cut th' velvet piles?" continued the weaver. "Yes! that I would!" replied the employer; "and I will reward any man handsomely who brings me a plan of doing it," added he. "Awm yore mon, then," said the operative. "Wod'll yo gi me?" he further asked. After some further conversation a bargain was struck, and a sum agreed upon, which the weaver should be entitled to claim in the event of his plan for automatically cutting the pile of the carpet being a success. Arrangements were made for its trial; the weaver made his preparations; the master, the manager, and one or two confidential employes gathered around the loom upon which the experiment had to be made, all others being sent outside the range of observation. The new form of wires was inserted, woven down, and withdrawn, leaving a well cut pile upon the face of the carpet. The weaver had won his reward, for it was honorably paid. An annuity of five hundred dollars was settled upon him, which he continued to enjoy until within a recent date, and for anything we know to the contrary may be enjoying it yet. He retired from the weaving-shed, determined to spend the rest of his days in ease and comfort. His employer secured by patent the benefits of his invention, it being one, among several others, which contributed to place that manufacturing establishment in the foremost rank in the trade, while its owners attained wealth and social eminence as the reward of their prudent enterprise.

FALLS OF THE ZAMBESI.

AMONG the multitude of interesting things narrated by David Livingstone, respecting the scenes encountered during his travels in South Africa, no one is more interesting than his visit to the Falls of Victoria, so named by himself (called Mosioatunya or Shongwe by the natives), in the Zambesi river. Livingstone, with his guide, went down the river in a canoe, and after twenty minutes' sail from Kalia they came in sight of the columns of vapor appropriately called "smoke," rising at a distance of five or six miles, exactly as when large tracts of grass are burned in Africa. He wrote:

"Five columns now arose, and, bending in the direction of the wind, they seemed placed against a low ridge covered with trees; the tops of the columns at this distance appeared to mingle with the clouds. They were white below, and higher up became dark, so as to simulate smoke very closely. The whole scene was extremely beautiful; the banks and islands dotted over the river are adorned with sylvan vegetation of great variety of color and form.

"Passing down the center of the stream in the eddies and still places, caused by many jutting rocks, brought me to an island situated in the middle of the river, and on the edge of the lip over which the water rolls. In coming hither there was danger of being swept down by the streams which rushed along on each side of the island; but the river was now low, and we sailed where it is totally impossible to go when the water is high. But though we reached the island, and were within a few yards of the spot, a view from which would solve the whole problem, I believe that no one could perceive where the vast body of water went. It seemed to lose itself in the earth, the opposite lip of the fissure into which it disappeared being only eighty feet distant. At least I did not comprehend it until, creeping with awe to the verge, I peered down into a large rent which had been made from bank to bank of the broad Zambesi, and saw that a stream of a thousand yards broad leaped down a hundred feet, and then became suddenly compressed into a space of fifteen or twenty yards. The entire falls are simply a crack made in a hard, basaltic rock, from the right to the left bank of the Zambesi, and then prolonged from the left bank away through thirty or forty miles of hills.

"In looking down into the fissure on the right of the island one sees nothing but a dense white cloud, which, at the time we visited the spot, had two bright rainbows on it. From this cloud rushed up a great jet of vapor exactly like steam, and it mounted two hundred or three hundred feet high; there condensing, it changed its hue to that of dark smoke, and came back in a constant shower, which soon wetted us to the skin.

"On the left side of the island we have a good view of the mass of water which causes one of the columns

FALLS OF THE ZAMBESI, AFRICA.

of vapor to ascend, as it leaps quite clear of the rock, and forms a thick, unbroken fleece all the way to the bottom. Its whiteness gave the idea of snow, a sight I had not seen for many a day. As it broke into (if I may use the term) pieces of water, all rushing on in the same direction, each gave off several rays of foam exactly as bits of steel, when burned in oxygen gas, give off rays of sparks. The snow-white sheet seemed like myriads of small comets rushing on in one direction, each of which left behind its nucleus rays of foam. I never saw the appearance referred to noticed elsewhere. It seemed to be the effect of the mass of water leaping at once clear of the rock, and but slowly breaking up into spray.

"I have mentioned that we saw five columns of vapor ascending from this strange abyss. They are evidently formed by the compression suffered by the force of the water's own fall into an unyielding, wedge-shaped space. Of the five columns, two on the right and one on the left of the island were the largest, and the streams which formed them seemed each to exceed in size the falls of the Clyde at Stonebyres when that river is in flood. This was the period of low water in the Leeambye; but, as far as I could guess, there was a flow of five or six hundred yards of water, which at the edge of the fall seemed at least three feet deep.

"The fissure is said by the Makololo to be very much deeper farther to the eastward; there is one part at which the walls are so sloping that people accustomed to it can go down by descending in a sitting position. The Makololo on one occasion pursuing some fugitive Batoka, saw them, unable to stop the impetus of their flight at the edge, literally dashed to pieces at the bottom. They beheld the stream like a 'white cord' at the bottom, and so far down (probably 300 feet) that they became giddy, and were fain to go away holding on to the ground.

"It had never been seen before by European eyes; but scenes so lovely must have been gazed upon by angels in their flight."

THE MANUFACTURE OF IRON.

OF all the mineral treasures that the earth affords, there is none more useful or necessary for the wants of man than iron. Take this single metal away and all the boasted progression of the age would relapse into the narrow confines bordering on the primitive arts of the untutored natives.

Among the many varieties of iron ore in the United States may be mentioned the magnetic ore, the bog ore, the brown hematite, etc. Pennsylvania is particularly rich in iron ore as well as coal; and a visit to one of her numerous iron manufacturing establishments, with its flaming furnaces and adjacent rolling mills, situated in a busy coal mining village, with tall, black chimneys vomiting flame, and wreathed in columns of billows of thick smoke from a hundred locomotives and stationary engines driving a world of whirring, jarring machinery everywhere, will well repay the tourist or scientific traveler. Eastern Tennessee presents similar scenes; and the city of Glasgow, in Scotland, and several cities of England, where coal and iron are found together in abundance, swarm with foundries and blazing furnaces.

Proceeding to the furnace, the observer finds before him a great stone structure, forty or fifty feet in height. A chamber or opening some six or eight feet square, lined with fire-proof brick, extends through the entire edifice from top to bottom. An embankment extends from near the mouth of the mine upward, with a gentle slope to the top of the furnace. Along this there is a smooth track or pathway constantly threaded by a busy throng. Back near the mine a company of men are seen carting and wheeling coal and iron-stone to the "Roasting Bed." A vast layer of coal is placed on the ground, in the open air, and upon this is dumped a large quantity of the ore. Another layer of coal follows, to be succeeded by another layer of ore; and so alternately until a considerable pyramid is formed, when the coal is set on fire, and the entire heap becomes a mass of glowing heat. By this means the iron-stone is roasted and freed from its sulphur and water. It is now ready for the furnace. An army of laborers wheel it forward, up the smooth inclined plane, together with a vast quantity of coal and earthy substance, sometimes clay and sometimes limestone. These latter materials are thrown in with the rest, to assist in separating the earthy matters found naturally united with the metal in the ore. It is termed flux, and assists in drawing the impurities from the molten iron.

Iron pipes open into the furnace underneath, through which a current of air is blown with great force by a steam-engine. This is termed "the blast." Sometimes the blast-pipes wind around the inside of the furnace before opening into it, by which means they become so heated that the forced current of air in the interior becomes hot enough to melt lead. This is known as the hot blast, and is much more useful in reducing the mass of material to a fluid state than the cold blast.

The time having arrived for drawing off the melted metal, the workman steps forward to remove the plug from the bottom of the furnace. Within is more than a hundred tons of fiercely burning matter, roaring and glowing with intense heat that, under the action of the hot blast, has for hours been sending vivid columns of flame in jets and angry flashes from its summit. Involuntarily the observer moves back, and the next moment the plug is withdrawn. A vivid white-hot stream of liquid iron pours forth, dazzling the eye with its intense brightness as it falls like water from a spout, and courses along a straight, narrow trench or channel in the sand-bed. From this channel, which is denominated the sow, numerous little channels branch off laterally along the sides. These are termed pigs. The beholder looks on with surprise almost akin to fear, while the glowing fluid mass rolls along the channel and spreads into the lateral branches, seething, hissing, and sending up minute coruscations and sparks as it proceeds, shedding a heated glow over everything, and blinding the eye with overpowering effulgence.

At length the molten stream is stayed and the metal allowed to cool. Its brightness soon begins to fade,—turns to pale ash color, and gradually changes to the darker color of cold iron. As soon as it is sufficiently cool to handle the lateral branches, or pigs, are broken off and piled up in immense heaps. This is what is known as pig-iron, and is not perfectly pure.

We have described a furnace situated near the mouth of an iron-mine. Sometimes, however, they are built at a distance away, when the ore has to be brought to the spot by railroad.

The crude pig-iron is now ready to be transferred to the puddling furnaces and rolling-mills. These great dingy-looking buildings, with rows of tall, blackened chimneys, rendered conspicuous by quick, short puffs of black smoke, that settle in great masses over the vicinity, and by the heavy, measured clang and jar of tremendous forge hammers, are observed not far away, and thither we bend our steps. The doors are generally found wide open, notwithstanding over many of them are placed the well known words, "No admittance." There is no floor, and the smooth, hard ground is in many places covered with dust and cinders. A babel of heavy machinery meets the view. Huge steam-engines are laboring in almost every direction, and the rattle of wheels and belts and the sharp hiss of escaping steam are heard continually.

Passing long piles of old iron and new castings, and vast ranks or cords of new pig-iron, we approach the puddling furnaces. A number of bars of this crude iron are taken from the pile and thrown into the furnace, the door of which is shut, and the blast applied. Hotter and hotter the mass becomes, and at length it dissolves, and commences to seethe and boil in a fluid sea of melted cinders. The workmen, stripped to the waist, leap forward and throw open the little circular door of the furnace, and with long iron rods commence to work and knead the melted mass as though it were wax or dough. The sweat pours down their hardy faces, which glow in the brilliant glare of the open furnace. After it has been worked and stirred sufficiently, a barrow is trundled up, and an incandescent ball of a hundred pounds weight or more drops from the glowing furnace-jaws, and is quickly wheeled away to a huge iron machine of great strength, termed the crocodile, or squeezer. To one unaccustomed to the place the heat is absolutely intolerable, and we willingly move back from before the hissing semi-molten ball of iron that illuminates the whole interior of the building with a red, dazzling flood of light, and content ourselves with beholding the work at a proper distance.

As the fiery mass enters the ponderous machine it comes in contact with cold water, and a sharp explosion ensues. The crocodile, worked by steam-power, squeezes out the cinders, and presses the iron into a lengthened cylindrical form. It is now grasped by a huge tongs, suspended by chains and pulleys, and handled by a single workman, swung around and placed between the rollers. As the red-hot bar emerges from the groove on the opposite side, another set of men stand in readiness to seize and return it through an adjoining groove. Back and forth it glides between those powerful rollers, each time by a different groove, changing its shape, until it last it assumes the desired form. In this way railroad bars or rails are made. While yet red-hot it is taken from the rollers, placed upon a carriage, and sawn off at the desired length, with as much apparent ease as though it had been a stick of wood.

Sometimes a mass of pig-iron is reduced to a bright, semi-fluid state in the forge-fire, and then placed beneath an immense forge-hammer, which, being moved by powerful machinery, strikes blows that fairly make the building jar. Coruscations and showers of scintillating sparks fly far and near like a deluge of fiery rain. After the impurities are hammered out, it is formed into a rounded shape, a foot or more in length, termed a "bloom."

During the evening, in the summer-time, these furnaces and rolling-mills present a scene that baffles all description. The crown of livid, flashing flame that surmounts the tall chimneys; the great Cyclopean eye of fire that glares from every window; the long streams of vivid light that pour forth like tongues of flame from every open door, form a striking contrast with the darkness without. The fire of the numerous puddling and heating furnaces; the red glare of the blooms, as they are borne along to the squeezer; the pale, translucent heat of the flat plates, as they are run through the rollers; the rattle and movements of the stupendous and complicated machinery; the peculiar buzz and extraordinary evolutions of the large fly-wheel; the hasty and determined movements of hundreds of athletic artisans,—all convey an idea of industry and enterprise perfectly magnificent to contemplate.

The history of iron manufacture in the United States is of curious interest. In the year 1607 the Virginia Colony was planted at Jamestown, and three years later Sir Thomas Gates (as quoted by Bishop in his History of American Manufactures) testified before a committee of Parliament that "various minerals were found in Virginia, especially iron ore, which had been tested in England, and found to produce as good iron as any in the world."

In 1619 the company sent to the colony a number of select workmen skilled in iron making, "to set up three iron-works." These workmen selected a location on Falling Creek, not far from Jamestown, and proceeded immediately to execute their mission, but whether they built three works or one we are not informed. In 1621, three of the master workmen having died, the company reinforced the "iron-works" by sending over twenty experienced workmen, under the direction of John Berkley and his son, who were expert iron-masters.

The enterprise appears to have been, in the main, successful; for Beverly, in his colonial history, says that "the iron proved reasonably good, though they had not got into the body of the mine." But in the disastrous massacre of 1622 the Indians killed most of the workmen and destroyed the works, and the company made no attempt to rebuild them.

The "ironworks" at Falling Creek was probably a Catlan forge or bloomery, which required no great skill nor expense for its erection. It is not improbable, therefore, that iron was made by the Virginia Colony as early as 1620, and this was evidently the first fruits of our iron harvest. The ore at Falling Creek is brown hematite. It is strange that an industry which opened with prospects so flattering should have been suffered to sleep for nearly a century before any effort was made to revive it, but colonial history makes no mention of iron-works in Virginia after this till the year 1715.

In 1637 the General Court of Massachusetts Bay granted to Abraham Shaw "one-half the benefit of any coles or yron stone which shall be found in any common ground which is in the countrye's disposing." Under this charter bog iron ore was discovered at Lynn, and specimens of it taken to London to induce the formation of a company to manufacture iron from it. This was successful, for in 1643 John Winthrop, Jr., came from England with workmen, and capital to the amount of one thousand pounds, and erected a "foundry" on the western bank of Saugus river. The village was called Hammersmith.

In November, 1644, the general court granted citizens the privilege of taking stock in the enterprise, and gave them "three years for ye perfecting their worke and furnishing of ye country with all kinds of barr iron, provided they would complete the finery and forge, as well as the furnace, which is already set up." The company was granted eighteen square miles of land to foster the new industry.

In 1645 they reported to the general court that "the iron worke is very successful both in ye richness of ye ore and ye goodness of ye iron," and they report further that "some tuns of sowe iron has been cast, and is in readiness for ye forge."

On this report the general court granted still further privileges to the company of undertakers for the iron-works, on the condition that they should erect and operate six furnaces, "and not bloomaryes only, and that they should furnish barr iron of all sorts for not exceeding twenty pounds per tunne."

This Massachusetts enterprise was the successful erection and working of blast furnaces for making castings for the various practical uses to which that form of the metal was applied, and the reducing of what the report quaintly calls *sowe iron* to bars of wrought iron under the forge hammer.

This may be regarded as the practical introduction of iron manufacturing into the United States. In 1648 Governor Winthrop writes that "the ironworks at Lynn runs eight tons per week, and their iron is as good as Spanish."

Between this and the year 1675 furnaces were erected at Braintree, at Taunton and at Topsfield. In the latter part of the seventeenth century Lynn was as celebrated for its iron manufacture as it has since become for the production of shoes. Pots, kettles, and other household utensils were produced at the Lynn foundries equal to those imported from Europe, and as early as 1650 we find one Joseph Jenks engaged in the manufacture of scythes and other edge-tools; and about this time, by order of the general court, cannon were cast and finished at Lynn for the defense of the colony.

In 1656 Capt. Thomas Clarke put into operation an "iron worke" at New Haven, Connecticut, under a guarantee of the Assembly that such "worke" should be exempt from the payment of tax; and in 1670 the enterprise appears to have been flourishing. There was an "iron worke," perhaps a bloomary, at Pawtucket, in Rhode Island, as early as 1672, and subsequently several others were started — all of which were destroyed in the Indian war of 1680.

In 1664 Henry Leonard, one of the first iron-workers at Lynn, removed to Shrewsbury, New Jersey, and set up an "iron forge," and in 1676 a grant of land was made to Colonel Morris to encourage the erection of a "smelting furnace" at Shrewsbury, which went into successful operation in 1680.

The early iron-works of New England all used bog ore, but the New Jersey enterprise used the specular or magnetic ores of the Orange Mountains. These bold advances of the colonies in so important an industry as the manufacture of iron could scarcely fail to attract the attention of the mother country, and consequently we find, near the close of the seventeenth century, complaints from the iron-masters that obstacles were thrown in their way, such as restrictions on the amount of iron made, heavy duties on iron sold in other colonies, and at last a special tax on bar iron made in the colonies, equal to the freight on English iron.

This policy had, to some extent, the desired effect to check the rapidly developing iron industry of the colonies, so that in the year 1700 the quantity of iron made in New England was not equal to that of 1675. But the depression was only temporary. The earnest protest of the General Court of Massachusetts procured a repeal or modification of the iron-tax, and the intercolonial duty served only to induce the erection of iron-works in the other colonies.

In 1714 the iron mines of Manatawny, forty miles up the Schuylkill, were opened by Thomas Rutter, Sen., who is now generally acknowledged to be the father of the iron interest in Pennsylvania. Rutter at first erected a bloomary and forge, but in 1720 he built a blast furnace. Following shortly after this several furnaces and forges were erected in Chester county, and the country of Newcastle (Delaware), which then belonged to Pennsylvania. Gov. Keith erected a furnace on Christina creek, in this county, some time in the period of his administration, which was from 1717 to 1726.

Alexander, in his report on the manufacture of iron, addressed to the governor of Maryland, gives 1715 as the epoch of smelting furnaces in Pennsylvania, Maryland and Virginia. In 1718 Maryland exported to England three tons and seven cwt. of bar iron, on which the mother country levied a duty of £6 19s 1d, or nearly thirty-five dollars.

Principio furnace and Russel forge were in operation at the head of Chesapeake Bay in 1722. These were followed in a few years by similar enterprises on Jones' Falls, near Baltimore, in Anne Arundel, Frederick, and several other counties in Maryland.

Col. Spottswood built a furnace at or near Fredericksburg, on the Rappahannock, some time prior to 1722, perhaps in 1715. This appears to have been the first attempt to revive the iron interest in Virginia after the disaster of the Falling Creek iron-works in 1622. Besides his smelting furnace, Col. Spottswood had a foundry at Massapony, where were cast chimney backs, andirons, fenders, plates for hearths, pots, skillets, mortars, rollers for gardens, boxes for cart wheels, etc., which, "one with another, could be delivered at people's doors at twenty shillings a ton."

Between 1725 and 1750 several bloom forges were erected and worked with profit in the valley of Virginia, and in 1760 a blast furnace was erected in the same region.

Sir Walter Raleigh, in his account of the discoveries of his expedition in 1585, speaks of mines of iron ore, which he locates within the boundaries of the present State of North Carolina. No account, however, reaches us of any attempt to utilize these early discovered ores till about the year 1728. In that year Scrivenor says there was exported to England from Carolina an invoice of iron consisting of "one ton and one cwt. of cast iron, and two quarters and twelve lbs. of bar iron." In the first half of the last century iron furnaces were in operation at Deep Run, in Guilford county, and on Buffalo creek, in Cleveland county, and forges and bloomaries in several other places, but I find it impossible to fix the specific dates.

In South Carolina iron was made in several places prior to the revolution of 1776, but I find the dates very obscure. The manufacture flourished till cotton became king, after which it declined; and though the northwestern counties of that state furnish an inexhaustible supply of magnetic ore of the best quality, yet there is now neither furnace, forge, nor rolling mill in South Carolina.

The iron interest in the New England colonies, early in the last century, began to recover from the depression which marked the close of the preceding century. In Massachusetts the iron manufacture extended itself westward into the region of the rich hematite ores of Berkshire county. In 1750 there were reported in operation six furnaces and nineteen forges for bar iron, four slitting mills and one steel furnace. Connecticut also made rapid progress in iron manufacture prior to the revolution. In 1732 a furnace was built at Lime Rock, which worked the now celebrated brown hematite ores of Litchfield, and another one was erected in 1762, which cast cannon and shot in large quantities during the revolution. Several bloomaries were operated in New Hampshire as early as 1750, but I find no mention of blast furnaces prior to the revolution.

Governor Cosby, in his report to Parliament in 1734, says that "though iron ore is plenty, no iron-work, as yet, is set up in this province" (New York), but in 1740 we find that Philip Livingston "set up" a bloomary in Colombia county, New York, but a few miles from the Litchfield mines in Connecticut.

This pre-revolutionary development of the iron interest in the colonies, without a doubt bore an important part in the final determination of that momentous struggle. If the colonies had been dependent on the mother country for the iron and steel that are so intimately connected with the everyday life of a civilized people, and especially if we had depended on a foreign nation for artillery, so indispensable in modern warfare, the result might have been very different.

THE GRIZZLY BEAR.

THE home of the grizzly bear is in the caves and silent retreats of the mountains lying west of the Missouri river, across Upper California. This animal to America is what the Bengal tiger is to Hindostan, and the lion to Central Africa. It is the most ferocious and powerful of its family, and dreaded by the hunter more than any other beast with which he comes in contact. The Indian fears it so much that a victory over the monster is an achievement which places the brave in an enviable position among his clan. When one is slain by the red man a necklace is made of the long claws and worn about the neck as a signet of valor, and this entitles him to the highest position of honor among his people wherever he may meet them.

There is a story told of an Indian's reproof to the fierce animal for what he considered a weakness. Having, by a lucky shot, broken the backbone of a grizzly, it set up a most plaintive cry. The hunter, instead of giving another shot, stood up close to him, and addressed him in these words:

"Harkee, bear! you are a coward, and no warrior, as you pretend to be. Were you a warrior, you would show it by your firmness, and not cry and whimper like an old woman. You know, bear, that our tribes are at war with each other, and that yours was the aggressor. You have found the Indians too powerful for you. Had you conquered me, I would have borne it with courage, and died like a brave warrior. But you, bear, sit here and disgrace your tribe by your mean conduct."

There is another tale told at the camp-fires of a hunter, long ago, who was driven by a storm into a cavern on one of the tributaries to the "Big Muddy," and, too late to retreat, found himself in the presence of the huge bear. All he could do was to fight for his life, and this he did right valiantly with his long knife.

The contest was desperate, but finally the herculean hunter succeeded in giving a death-stroke to his contestant, but it was the finishing effort, for the man fell beside the expiring enemy exhausted and bleeding from the wounds that he had received, besides having an arm and leg broken.

In a semi-conscious condition he lay for several hours, and when he recovered mental action, found himself so stiffened and sore that he was unable to move from the spot where he had fallen. For two days he subsisted on the meat of the bear, but there was no means in the cavern for quenching his thirst, which at that time had become so intense that the wounded, stiffened hunter became almost frantic.

By slow, painful movements he drew his body along upon the earth, and after a protracted struggle reached the river's margin and quenched his thirst. This gave him strength, but he did not dare an attempt to return to the cavern, so he hauled himself, with a snail-like motion, along the sands of the river, gathering small fishes, clams, and whatever else he could get hold of in the way of food.

Not half the required nourishment could be obtained in this way, and his strength again leaving him, he laid himself down to die of starvation in the wilderness. While lying thus a deer came rushing down the valley, pursued by a wolf, and the famishing hunter was gratified to see the timid animal slain by the fierce enemy.

HOME OF THE GRIZZLY BEAR.

After the wolf had satisfied its hunger, the now hopeful man again crept forward, and succeeded in gaining the coveted spot, thus once again satisfying the gnawings of his appetite. His strength was revived and his spirits buoyed up.

Casting about him, he saw a portion of the trunk of a tree not far away, and the idea at once occurred to him of rolling this into the stream and using it as a float to carry him down the river.

After the labor of a day, lying upon the earth, and with only one hand to use, he succeeded in getting the tree-trunk into the water and crawling upon it. The current carried him on to the Missouri, and then he floated down the broad water-course until opposite Council Bluffs, where he was rescued in a most pitiable condition.

Something of the wonderful strength of the grizzly bear may be estimated from the fact that it is able to drag away the body of a buffalo, and to dig a pit and bury it; and something of its tenacity, from the account given of Governor Clarke's party, who shot one with ten large balls, four of which passed through the lungs and two through the head, and the animal thus wounded survived twenty minutes, swimming half a mile in that time.

A few weeks ago Dr. Swain, of Sacramento, went on a hunting expedition to a point about one hundred miles from there, in the eastern part of Monterey county. In the company was an old mountaineer called "Rocky," who had become famous as a bear hunter. One morning Rocky started out of camp and was laboriously toiling along a narrow trail on the side of a deep canyon. When in a wild portion of the mountains, he saw on the other side of the canyon two young grizzlies playing on a grassy beach of land. Immediately his splendid revolving rifle was at his shoulder, and he fired. One cub he killed instantly, but the other lived long enough to cry almost like a child for the mother bear. Soon a crackling of bushes was heard behind, and Rocky turned just in time to see the mother, enraged and excited, almost upon the slayer of her offspring. The bold hunter again raised his rifle, but before he could use it the bear, by one stroke of her powerful paw, hurled it far out of his reach. A hand-to-hand encounter was now the only way out of the difficulty, and Rocky drew his huge knife. He raised it, and swiftly it descended, gleaming through the air into the heart of the bear, and none too soon, for as he struck, the bear also dealt him a powerful blow on his side, which stretched him insensible some distance from the scene of the encounter, the knife remaining buried to the hilt in the bear's shaggy side. After a time the hunter recovered sufficiently to drag himself to camp, where he was obliged to remain for several days before he recovered from the terrible blow he had received. Other members of the party went to the place and found the cubs dead, and a short distance from them the old bear, also dead. The gun and knife were recovered, and for several days bear steaks were the bill of fare in that camp. Dr. Swain says the meat of the cubs was delicious—fat and tender. There are many grizzlies in that section, and only the most experienced hunters, like Rocky, have any business hunting them. There is probably no animal in the world more dangerous or difficult to kill than the grizzly bear of California.

HORSE-POWER.

WHEN steam engines were first introduced, they were largely used to take the place of horses before employed for raising water from mines. Naturally, people asked, when buying an engine, how much work would it do, that is, how many horses did it represent. The early engine builders found themselves greatly at a loss when this question was first asked. They had at once, therefore, to determine how many horses an engine was equal to.

The first thing was to find out how much a horse could do. The strongest English horses, the London brewers' horse, were far above the very best that could be found elsewhere. They were found to be able to travel at the rate of two and one-half miles per hour, and work eight hours per day. The load was pulling a one hundred-pound weight out of a shaft by means of a rope. When a horse moves two and one-half miles per hour, he travels two hundred and twenty feet per minute, and of course at this speed the one hundred and fifty pounds would be raised vertically that distance. That is equal to three hundred pounds lifted one hundred and ten feet per minute, or three thousand pounds eleven feet, or thirty-three thousand pounds one foot high, in one minute. The thirty-three thousand pounds lifted one foot high every minute is taken as a standard horse-power. It is much more than any ordinary horse can do, and, therefore, the engine builders were always sure that their engines would take the place of as many horses as the horse-power would indicate that they would.

Of course thirty-three thousand pounds lifted one foot per minute is much more convenient for calculation than one hundred and fifty pounds two hundred feet, and therefore the former form has been adopted; the amount of work, or number of foot pounds, however, is just the same in either case. A foot pound represents the amount of power required to lift one pound one foot high. It is comparatively easy to estimate the horse-power of an engine with a reasonable degree of accuracy, provided we know certain things in regard to it. We must know the pressure in the boiler, the diameter of the cylinder, the length of stroke, the number of revolutions per minute which the engine is making, and lastly, the point at which steam is cut off.

When there is no cut off, steam is admitted into the cylinder during the whole stroke, and a cylinderful of steam at boiler pressure is used at each stroke, as the cut-off, when there is one, takes place before the piston has reached the end of the cylinder. If steam is prevented from entering the cylinder after the piston has passed mid-stroke, this point of cut-off is at half-stroke. If the steam enters the cylinder during three-quarters of the stroke, and is then arrested, the point of cutting off is at three-quarters of the stroke. It is necessary to know the point of cutting off, in order to find out what the average pressure is in the cylinder. In the commoner sort of engines, not provided with independent cut-off valves, the point of cutting off may usually be taken at from one-half to three-quarters of the stroke, though sometimes more than this. It may, perhaps, be safe to take the average pressure in the cylinder at about eight-tenths of that in the boiler; though where the steam-pipe is long and the throttle-valve used to control the speed, the average pressure in the cylinder may be no more than three-quarters of that in the boiler.

The power will be the distance which the piston, under this pressure, travels during one minute. Therefore we have the rule: Multiply the area of the piston by the average pressure per square inch upon the piston; multiply this result by the distance which the piston travels per minute in feet, and the result is the number of foot pounds per minute which that engine can raise.

Divide by 33,000, and the result is the number of horse-power. The number of feet per minute traveled by the piston is twice the number of strokes per minute multiplied by the length of stroke. This gives the number of horse-power sufficiently near for all practical purposes.

COLORING MATTERS.

THE coloring matters used in dyeing are derived from many sources. Some occur in the roots, others in the bark or stems, and still others are found in the seed and flowers of the plant from which they are extracted. These coloring matters are taken from the plant after its power of subsisting in life has ceased.

The dyes used to give a red color are taken from the cochineal insect, safflower (earthamus), Brazil-wood, madder, etc. Blue colors are obtained from indigo, litmus, etc., and yellow dyes from saffron, turmeric and fustic.

Of the agents named, as used in dyeing red, madder is the chief. It is the root of a plant found in some parts of France, principally the south. It is also cultivated to some extent by the Turks. The plant contains a number of principles known as *alarin*, *purpurine*, *xanthine*, etc. The most important of them is alizarin, to which the coloring power of madder is due.

Cochineal is a dried insect, which feeds, when alive, on the cactus, a tropical plant, to which its coloring power is due. The latter forms a rich red color, known as carmine. It is chiefly used in dyeing silks. The manner of obtaining the dye from the cactus may be briefly described as follows: It is first steeped in a solution of soda (cold) for some time, when cotton wool is introduced as an absorbent of the color. A solution of lemon juice is then added to cleanse the wool of all impurities. The whole process is repeated until the wool is full of color. Another lot is then introduced. The color is removed from the wool by immersing it in hot carbonate of soda.

But all of these colors are volatile and fleeting, and require a mordant to fix them permanently in the material to be dyed. Its action may be understood from the following experiment:

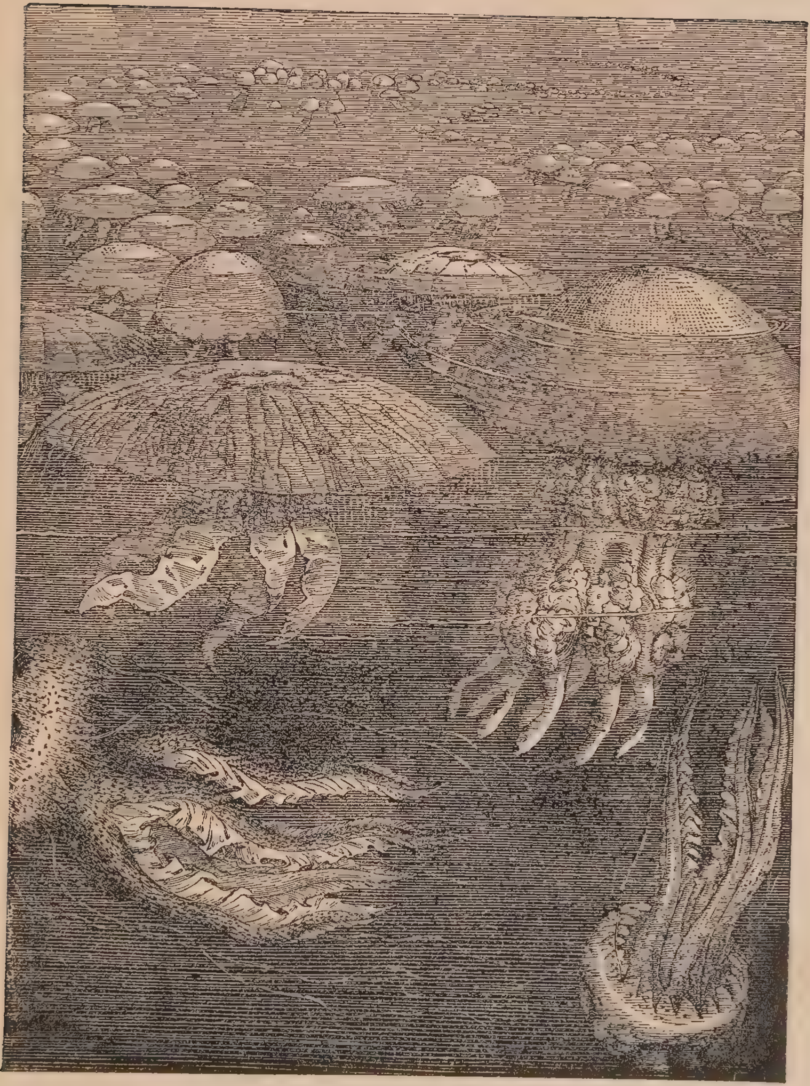
In a solution of sulphate of iron soak a piece of cotton, then place in an infusion of logwood, and the cotton will acquire a permanent black color.

In this case the iron is the mordant employed, and its usefulness may be seen from the fact that were the cotton to be placed in the logwood only, it would be a dirty brown color. The mordants used in dyeing are salts of iron, tin, alumina and chromium. An acetate of iron is also largely used. It is prepared by dissolving scraps of iron in pyroligneous acid.

THE JELLY-FISH.

WHILE the world above the great waters of the oceans is so full of curious and interesting living things as to keep mankind constantly studying to understand them, yet wonders beneath the briny billows are no less numerous, curious and interesting. The sea is as full of life as the earth and air; living creatures are there of all sizes, from monstrosities to minute insects which cannot be detected with the naked eye. Some of them have the most unsightly and ugly forms, while others are charmingly beautiful, variegated with all colors and tints of colors. Among the most interesting of these is the acaleph family, or jelly-fishes, of which there are numerous species, but from some instinctive knowledge, each particular species keep separated from those unlike themselves, and yet millions upon millions of a kind are found together. One scientific writer says that off the coast of Chili they not only crowd the surface of the sea for about one hundred and sixty English square miles, but the water is full of them to the depth of six feet from the surface.

In an account of the voyage of a steamship, named the Crocodile, occurs the following strange statement: "On September 21 the ship crossed the equator early in the morning. On the following night a most curious circumstance occurred which would hardly be credited. The ship was stopped by jelly-fish, which, shortly after one o'clock, appeared in myriads as far as the eye could reach, and the thousands of luminous bodies floating upon the water gave the appearance of a scene from



THE JELLY-FISH.

fairyland. Some of the fish got into the strainers of the condensers and blocked the holes so that the water could not enter, and the result was that the vacuum went down and then disappeared entirely. The condensers afterward became so heated that we had to stop steaming altogether, take off the strainers, and clear them. Three attempts were made to steam, and each failed from the same cause. In this way we were delayed no less than five hours; but at daybreak the fish sank, and the ship was able to proceed. The same thing occurred again on the following night, the ship being delayed four hours."

It is only in very calm weather, however, that they come to the upper surface of the sea in such numbers. They are very delicate creatures, and cannot stand usage of the dashing, tumbling waves. When it becomes rough they quickly descend to the quiet ocean depths. This they do by letting the umbrella or mushroom-like top of their body fall down the sides of their tentacles, in the manner of the one shown near the bottom of our engraving. The tentacles are the arms of the creature, and are used as people use theirs, to convey food to their mouths, said mouths being situated underside of the body. The stomach is under the umbrella-like top. In one species, however, there is no mouth, the nourishment being absorbed through the branching vessels. The eyes are numerous, and located around the rim of the bowing top.

The jelly-fishes are sometimes called sea-nettles, because when they come in contact with human flesh they leave an acute, stinging pain, similar to that experienced when stung by nettles, only sharper, and with more of a tingling sensation. The disagreeable feeling increases until the whole nervous system is affected, causing, sometimes, a pain to dart through the body as if a rifle-ball had passed there. The heart and lungs suffer also; indeed, the victim feels strange all over, and, if it is his first experience, becomes greatly alarmed, sometimes believing he is going to die. Often the uncomfortable condition lasts for several days. People bathing in the sea who have met the nettle-fish once are pretty careful not to come in contact with it again.

Another name which jelly-fishes bear, and very appropriately too, is that of sea-lanterns. They are called thus from their power to emit a light which looks beautiful in the night, and always attracts the attention of mariners when they come upon the shining objects.

The phosphorescent lights deck the broad expanse of the ocean sometimes as far as the eye can reach. In the sunlight, also, these fish reflect colors bearing all the tints and shades of the rainbow, but the scene is not so grand and imposing as when viewed in the darkness and stillness of the night.

Many a person has stood almost entranced watching the silent waters shining with jelly-fishes, and looking, in contrast with the surrounding gloom, as if they were studded with the most precious gems. Many, too, have stood enraptured at mid-day, watching the wonderful *acalephæ* pressing in shoals through the clear water, pulsating as if the whole being were but a translucent heart trailing behind them their delicate fringes of waving cilia and rolling gently over as if in excess of happiness.

Everything above, around and beneath, when we contemplate the wonderful beauty and perfection of creation, tells unmistakably of an omnipotent hand,

and gives, outside of the light of revelation, proofs that are sufficient to convince any reasonable, rational mind of a living overruling power.

THE CLOCK OF CLOCKS.

IN Reading, Pennsylvania, there was lately exhibited the most wonderful clock in the world. It was built by Stephen D. Engle, a watchmaker, at Hazleton, Pa. He is about forty-five years of age, and was twenty years in perfecting the clock. Engle never saw the Strasburg clock. In fact he has not traveled more than two hundred miles from home at any time. This clock stands eleven feet high. At its base it is about four feet wide, and at the top about two. It is about three feet deep at the base, gradually less toward the top. Its colors are brown and gold. The Strasburg clock is thirty feet high, yet its mechanism is not so intricate, nor has it as many figures, as the Hazleton clock. The Strasburg clock's figures are about three feet high, and the American clock about nine inches. Three minutes before the hour a pipe organ inside the clock plays an anthem. It has five tunes. Bells are then rung, and when the hour is struck double-doors in an alcove open and a figure of Jesus appears. Double-doors to the left then open and the apostles appear slowly, one by one, in procession. As they appear and pass Jesus they turn toward him. Jesus bows; the apostles turn again and proceed through the double-doors in an alcove on the right. As Peter approaches, Satan looks out of a window above and tempts him. Five times the devil appears; and when Peter passes, denying Christ, the cock flaps its wings and crows. When Judas appears, Satan comes down from his window and follows Judas out in the procession, and then goes back up to his place to watch Judas, appearing on both sides. As the procession has passed, Judas and the three Marys disappear, and the doors are closed. The scene can be repeated seven times in an hour, if necessary, and the natural motion of the clock produces it four times an hour; whereas the Strasburg procession is made but once a day, at twelve o'clock. Below the plaza is the main dial, about thirteen inches in diameter. To its right is a figure of Time with an hour-glass. Above this is a window, at which appear figures representing Youth, Manhood and Old Age. To the left of the dial is a skeleton representing Death. When the hour-hand approaches the first quarter, Time reverses his hour-glass and strikes one on a bell with his scythe, when another bell inside responds; then Childhood appears instantly. When the hour-hand approaches to the second quarter, or half hour, there are heard the strokes of two bells. Then Youth appears, and the organ plays a hymn. After this Time strikes two and reverses his hour-glass, when two bells respond inside. One minute after this a chime of bells is heard, when a folding-door opens in the upper porch, and one at the right of the court, when the Saviour comes walking out. Then the apostles appear in procession. The clock also tells of the moon's changes, the tides, the seasons, day, and day of the month and year, and the signs of the zodiac; and on top a soldier is constantly on guard, walking backward and forward. As the hours advance Manhood, Old Age and Death take part in the panorama.

THE MANUFACTURE OF OIL-CLOTH.

THE cloth or canvas used in the manufacture of oil-cloth is a very strong fabric, made of flax and hemp, painted on both sides; the under side being plain, the upper side ornamented with patterns or designs of two or more colors. The cloth used for this purpose should be without seam, so that when pieces of great width are required, two men are employed at the loom, one on each side, for throwing the shuttle back and forth. This kind of cloth being woven for this purpose alone, its manufacture forms a distinct branch of business. Pieces are made from eighteen to twenty-four feet wide, and the length often exceeds one hundred yards.

When the canvas is received at the manufactory the bales, containing one hundred or more yards, and weighing nearly six hundred pounds, are opened and cut in pieces of sixty or one hundred feet, as may be required. These pieces are then taken to the "frame room," which consists of a number of strong wooden frames, standing upright, a few feet from each other. The space between the frames is occupied by a scaffold of four tiers, which may be reached by means of a ladder at one end of each frame. The edges and ends of the canvas are fastened to the frame, and by means of screws the beams of the frame are moved so as to tighten and stretch it to its utmost tension. In this position every part of the cloth can be reached from the several platforms. The first operation, preparatory to painting, is covering the back of the canvas with a weak solution of size, applied with a brush; and, while yet damp, the canvas is thoroughly rubbed with pumice-stone. By this means the irregularities of the surface are removed, and the size penetrates the interstices of the cloth, so preventing the paint, which is afterward applied, from penetrating too far, which would render the oil-cloth hard and brittle. This priming and scouring are carried on from the top downward.

When the surface is dry, a coat of paint, made of linseed oil and some cheap coloring matter, is applied. This paint is very thick and is thrown on the canvas in dabs with a short brush; it is then spread with a long and very elastic steel trowel. The paint is thus thoroughly worked into the web of the cloth, filling up all inequalities and rendering the surface smooth and level. The "trowel-color," as it is called, is allowed to dry ten days or longer, according to the weather, after which a second coat is smoothly laid on with the trowel, which completes the work for the under side of the canvas. After the first coat of paint is applied to the under side, the same process is commenced on the face side of the cloth; the size is applied, then rubbed in with pumice-stone; the first trowel color is then on, which, when dry, is also rubbed down with pumice-stone; two more coats are applied with a trowel, with a pumice-stone rubbing after each. Finally, a fourth coating of paint is applied with the brush, which is the ground color for the designs which are to be printed on it. The floor-cloth is thus completed, the various occupations taking from two to three months, when it is ready to be removed from the frames and transferred to the printing rooms.

The printing of the cloth is done on a flat table, over which it is drawn as fast as the designs are impressed. This is done with wooden blocks, not unlike those used in the old method of calico-printing. As the patterns generally consist of several colors, there are as many blocks and as many separate printings as there are colors in the designs.

In preparing a set of blocks for printing oil-cloths, an accurate colored sketch of the design is first made on stout paper. A blank sheet of paper is then placed under this, and by means of a sharp point, all that portion of the device including one color is marked on the under sheet in a series of dots or holes. This being removed, another blank sheet is placed under the pattern, and all the figures of another color are pricked out in a similar manner. Thus the pattern is dissected on as many sheets of paper as there are colors to be printed. One of the pricked sheets is then fixed on the surface of a block, and a little powdered charcoal is then dusted over it from a muslin bag, so as to penetrate the hole. The dotted line thus made on the block serves to guide the pencil of the engraver when the paper is removed, and enables him to draw the portion of the pattern required for that block. The same plan is pursued with other blocks, which are then ready for the engraver, who cuts away the wood, and leaves the pattern in relief.

The blocks used for printing are generally about eighteen inches square, the engraved portion being made of some close-grained wood, such as the pear tree, and fastened to blocks of pine. These engraved blocks, in large establishments, constitute a very valuable portion of the stock. Before the designs are impressed on the cloth, it is made slightly rough by means of a steel scraper and a scrubbing brush, which prepare it to receive the colors more readily. Near the printing table is placed a number of flat cushions, on which the coloring matter is first placed with a brush. The printer presses the block on the cushion, which is charged with the color, and then applies it to the cloth, holding it firmly, at the same time striking it several blows with the handle of a heavy hammer. A second printer charges his block with a different color, and applies it in the same manner. He is followed by a third, and as many others as may be required to form the most variously-colored pattern. As fast as the cloth is printed it passes through an opening in the floor to the drying room, where it becomes hard and ready for use. Narrow pieces, for halls and stairs, are first cut the required width, and printed in the same manner, except that a space is left on each side for a border, which, requiring smaller blocks, is put on afterward. Sometimes drying oils are used to hasten the completion of the work; but this makes the cloth brittle, and of inferior quality.

There are various large manufactories of oil-cloths in the United States, and the value of their production is about two and a half million dollars yearly. A still cheaper floor covering is made of stout, strong paper, painted in colors, but it has not yet attained an extent which enables it to be called a "great industry."

THE CHIMPANZEE.

IT is supposed that Dr. Livingstonehas made the world acquainted with a "new chimpanzee,"—a species of ape hitherto entirely unknown. The natives call these creatures "men," and unfortunately they look just enough like men to be criticised by the standard of human beauty, and so to appear very disgusting. They go in squads of ten, more or less, each male with his wife. They have their "music" when they want it, by drumming on a hollow tree or log, and yelling all together, as loudly as they can. The curious fact that, on difficult journeys from place to place, the husband soko "carries the baby" would intimate that these apes are in one respect superior to some human savages. From the "Last Journals of Dr. Livingstone" we extract the following interesting account:

"Four gorillas, or sokos, were killed yesterday. An extensive grass-burning forced them out of their usual haunt, and, coming on the plain, they were speared. They often go erect, but place the hand on the head as if to steady the body. When seen thus the soko is an ungainly beast. The most sentimental young lady would not call him a "dear," but a bandy-legged, pot-bellied, low-looking villain, without a particle of the gentleman in him.

"Other animals, especially the antelopes, are graceful, and it is pleasant to see them, either at rest or in motion. The natives are also well made—lithe and comely to behold; but the soko, if large, would do well to stand for a picture of the devil. He takes away my appetite by his disgusting bestiality of appearance. His light yellow face shows off his ugly whiskers and faint apology for a beard; the forehead villainously low, with high ears, is well in the background of the great dog-mouth; the teeth are slightly human, but the canines show the beast by their large development.

THE CHIMPANZEE.

"The hands, or rather fingers, are like those of the natives. The flesh of the feet is yellow, and the eager-ness with which the Manyuema devour it leaves the impression that eating sokos was the first stage by which they arrived at being cannibals. They say the flesh is delicious.

"The soko is represented by some to be extremely knowing, successfully stalking men and women while at their work, kidnapping children and running up trees with them. He seems to be amused by the sight of the young natives in his arms, but comes down when tempted by a bunch of bananas, and, as he lifts that, drops the child."

THE WANDERING MINSTREL.

MANY years ago, and during that time so well known as the "Dark Ages," when our language was but half formed, our literature almost without a beginning, and the mass of the people in a deplorable state of ignorance, there could be seen, at intervals, the wandering minstrel, roaming from land to land, with harp slung over his back, or, it may be, borne by some faithful servant. Now stooping beneath some wide spreading tree, now adding mirth to an evening party, or forming a welcome guest in the halls of kings, and of men of noble blood, he roused their spirits by his stirring ballads of love and war.

He formed a striking contrast to the cell-loving monk, whose seclusive habits cut off all intercourse with the men about him, and, consequently, the feeling that existed between the two was far from having any tendency to friendship.

The minstrel was naturally very popular. He was known to all and welcomed by all. It can be imagined with what delight his coming was hailed by the people whose only instruction consisted, for the most part, of what he had to tell them. Reading was unknown to the majority; and even had it been taught them, the scarcity of books, and the want of all other literature, would have precluded them from benefiting very much from such an acquirement. Very few festivals took place without the cheering mirth of the minstrel.

He was present on all state occasions, at tournaments, at nuptials, and even on any solemn occasions. It would seem that the mirth on any occasion could not be complete without his presence. It must, however, be remembered, that he was something more than a minstrel in our sense of the word. His abilities were not exhausted in the recital of poems, or in performing upon the harp.

In him were combined a multiplicity of talents. Besides his skill as a poet and musician, he possessed wonderful imitative powers, and by his gestures, which are now included in the professions of juggler and tumbler, gave additional amusement to his audience.

And yet his vocation was not very much looked down upon by the higher classes. It was in the garb and in the character of a minstrel that Alfred entered the camp of the Danes; and the fact of his having a servant behind him to bear his harp only confirms what is known to have been customary with many of the minstrels. The dress, which was peculiar to the minstrels, and which Alfred must have assumed, consisted of a long green gown, with sleeves to the middle of the leg. A large red belt girted his waist; and not unfrequently there was a red ribbon about his neck. His *tonsure* somewhat resembled that of the monks. A pair of soot-blackened boots, and a few minor adornments completed his attire.

In early Grecian times the bards, of whom Homer was a specimen, sang their own lays to the accompaniment of the lyre, as did the "scalds" of northern Europe some centuries after. There was, however, another class of reciters, known as the rhapsodists, who neither rehearsed their own verses nor used any manner of instrument, relying solely upon the effect they were capable of producing by their voice and gestures. Like the minstrels, they went from one place to another, known by the laurel branch they bore, just as the minstrels were distinguished by their peculiar badge,—a wrest turning or key.

The gradual downfall of minstrelsy took away many of the attributes which formerly belonged to the wandering life of the bard. The minstrel was only to be known as the musician and poet, while feats of jugglery and gesturing were taken up by another professional class. The minstrel is now the poet; the juggler and tumbler are now the professions followed only by the lowest classes of people.

BATHING IN FAMOUS WATERS.

THE Jordan is about the color of a new slate — a slate with the greenish-grey cloud still covering the surface. Its waters are opaque, thickened with clay, but delicious in temperature, and very refreshing to a pilgrim's palate. Is it a wonder that the river rushes like a mill-race? From its source to its mouth, one hundred and thirty-six miles in a bee line, it descends three thousand feet. Its very name, "Yarden," in Hebrew signifies descent. It twists and turns until it has trebled the natural course from fountain to sea. It rises in its might and covers the plains, and drives back the flocks and herds that feed along its banks. You cannot bridge it; often you cannot ford it.

We got out of our clothes, and with the fresh air of the morning blowing upon us we passed into the cleansing flood. There was life in every drop of it. There can be no doubt about it; as a tonic the Jordan is unrivaled. While we waded cautiously near the shore, sitting down in the clay bottom to get as much of the water with as little of the current as possible, we were startled by a crashing of underbrush and a thunder of feet. Out of the bush emerged the Russian pilgrims in the wildest excitement. Each strove to be the first to plunge into the stream. Many of them were already half naked, and they speedily stripped, put on a long white garment — a kind of shroud in which it is their wish to be buried — and having immersed themselves in the Jordan, they took off the shroud, rolled it carefully up, and having placed it in their luggage returned quite naked to pass a half hour in the river.

Off for the Dead. Sea! A rapid run in the fresh morning air, over the parched plains. Much of the way we followed the Jordan bank, and were sheltered somewhat by the foliage that fringes it. All this time, though we could have leaped into the stream with a hop, skip and a jump, we caught only occasional glimpses of the river as it rushed like a mill-race between its steep clay walls, buried out of sight by its luxurious groves of willow. Until we were actually upon the shore of the sea, ploughing through pebbles and soft sand, we strained our eyes in vain toward the valley of death, eager to catch a glimpse of its bitter waters. Our trail wound through a dense growth of cane, oleanders, cactus and tamarisk. We trotted over the baked soil in Indian file, thinking of the wild boars, wolves, jackals and leopards that prowl in the vale of Gilgal — the vale that was of old compared to "the Garden of the Lord." We saw nothing, not even a vulture, though no panorama of the Dead Sea is complete without a shadow of his wings darkening the canvas.

Out of the splendid distance, over the Salt Sea, the Sea of Asphalt, the Lake of Lot — call it by what name you will, for it bears all these — over the Eastern Sea of the old prophets, stole the withering breath of a furnace. Our horses sweltered in the heat. There was no possible shelter near the shore, for our camp trappings had already gone up into the wilderness. A dip into the gummy and elastic water was all we asked now, and in ten minutes we stood upon the sand half blinded with the heat and glare that nearly overcame us before we were safely out of it. The sea near the plain of the Jordan is shallow. Looking toward the south, the eye is lost in the profound mists that envelop it. Six and forty miles of sky-blue crystal, thirteen hundred feet in depth, the topmost wave of which is thirteen hundred feet below the level of the Mediterranean. Neither fish, shells nor coral are found here. There are fish-bones on the shore, the wrecks of the Jordan. The bitter oil — it is hardly worthy of the name of water — strangles everything to death, and then spits it out into the sun. Six million tons of sweet water fall into the Dead Sea daily; six million tons rise out of it, spiritualized, and float over it.

When we passed into the water we felt the weight of it before we had got knee deep. Soon we grew buoyant, and kept our balance with some difficulty. It was like trying to swim on corks that won't keep their places. A few steps farther and over we went, heels up, and, to our surprise, heads up, likewise. The bath was certainly most refreshing, and the novelty of it not unlike a good-natured practical joke. When least suspicious, over we went on all-fours, bobbing like bladders, and finding it extremely difficult to make much headway through the almost solid waters. The Dead Sea does for a change of medicine; it is as bitter as gall; but I would as soon think of swimming in a strong solution of feather beds. When we had once more got into our clothes and struck out for the wilderness, our skin burnt like fire, and we shed flakes of salt in such profusion you might have easily mistaken us for members of the Lot family.

THE BARBER IN THE EAST.

IN the East everything is grave and systematic, and particularly is it so among the Turks. For instance, if you can possibly induce a Turk to sing you but one verse of a Turkish melody, he must go through much preparation before he commences. First his pipe must be freshly filled; then he gravely strokes down his beard and looks all about him to see that each one is giving him proper attention; then he hums a few words gently to himself, plays imaginary notes with his fingers in the air, finally opens his mouth to an alarming extent, and produces the most inharmonious sounds that can possibly be imagined. But we have nothing to do at present with oriental musicians or their strains, except to observe that the same etiquette is carried out in every other pastime as well as in commencing a musical performance.

The occupation of a barber is only known among those nations that have made a certain progress in civilization, and all over the East they have been for many ages noted as important members of the state. In India the barber is the great newsmonger of the town; there is not a thing stirring nor an ill-wind blowing that he is not aware of, and the information retailed piecemeal by him to every customer that visits his shop. In China, a barber's experience is very extensive; he deals not only with the heads but the tails of the people, and his skill is acknowledged from the emperor down. But it is in Turkey, in the land of the caliphs, that he is to be met in all his dignity, honored by the multitude and enjoying familiar intercourse with the pasha. He is always an early riser, and commences the day's operations by experimenting upon himself. His mustache is a model for curl, gloss and length, his head smooth and hairless as a friar's, his costume in the height of Turkish fashion, and in the season he is sure to have a sweet-smelling posy fastened in his button-hole. There he stands complete; the terror of young gentlemen with a weak growth of beard or a tender head, and the aversion of the day laborer, compelled to visit him with an eight days' growth of beard to submit to his rough management.

Thus equipped, and refreshed by his early coffee and pipe, off he goes to his shop, and there, long before any one is astir, his floor is swept, his shelves dusted, fresh napkins spread out, his chairs and stools set in order, and the business of the day begins in earnest.

In comes an old gentleman suffering with rheumatism. He is very particular that not one item of etiquette shall be dispensed with in the Turkish shaving operations. After a long string of compliments have been exchanged, and the weather carelessly alluded to, he seats himself ceremoniously in the barber's chair and awaits the attack upon his head and beard. First he is carefully relieved of his heavy turban, which is laid upon the shelf and covered with a snowy napkin; then he is enveloped in a long apron from his chin to his heels; that ties behind, leaving him a victim to the flies, which tickle his head and wander in and out of his beard at their own pleasure, until, in a state of frenzy, he calls loudly upon Mahomet and the barber. The last named personage rushes to his assistance with a huge basin of hot suds, and in a trice we have lost sight of the poor old victim, whose head and face present one extensive field of froth, soap-bubbles and hot vapor. Now is our barber in his element, scrubbing away with a huge hair bag on each hand; suddenly he darts to one side, seizes a basin full of very hot water, and the next instant head, soap-bubbles and all are drenched with this. In a few seconds the head reappears, with inflamed face and eyes starting from their sockets, sputtering and groaning for breath. Barely has he had time to recover himself than another basin is produced and the head again is lost to sight. This time the water is bitter cold, and the whole frame quivers from the sudden shock. On again appearing a ghostly pallor is over his face, but a dry towel soon restores his natural complexion, and a razor is now gently passed from the crown of his head round to his chin with wonderful speed, leaving a small tuft of hair on the crown, and the much prized oriental mustache.

The old customer, now released, rises, and after washing face and hands goes through the operation of having all his joints cracked, and off they go like a small battery of Chinese fire-crackers. His turban is now restored, pipe and coffee handed to him, and, seated in an easy-chair, we will leave him sipping the one and whiffing the other to his entire satisfaction.

The next customer the barber has to deal with is, perhaps, an oriental dandy, who, after going through the same operation, stands at least five minutes before the glass twisting and curling his mustache into a variety of shapes, and gazing at himself with evident admiration. At length off he goes, and after him a whole posse arrives.

By midday the barber's shaving and shampooing labors are over, and he passes his afternoons in notching scores against creditors, or else notching the heads of those who come to him suffering from sick headache, and doling out the bits of gossip he has picked up to the inquisitive and gossiping portion of the community, who seek there for fashionableness, and information respecting affairs of state.

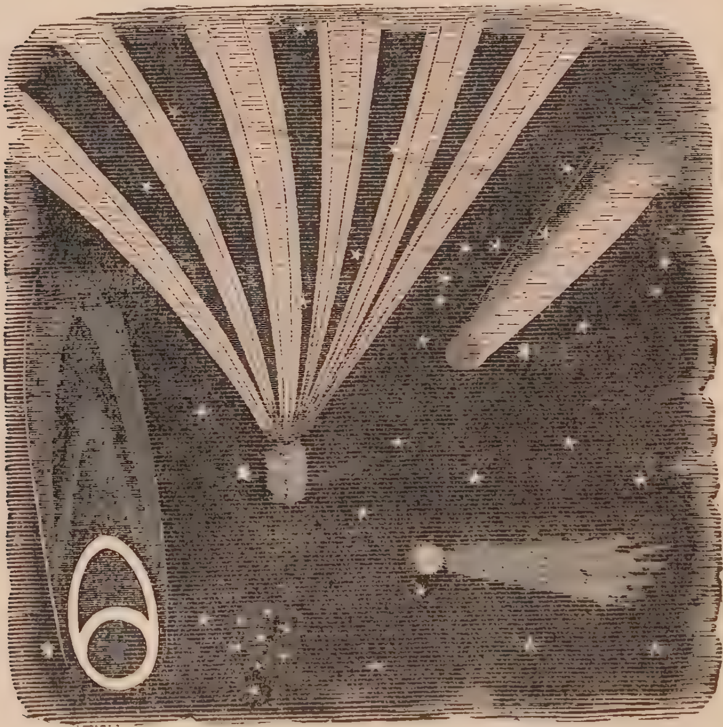
The sign of the surgeon-barber is a striped pole from which suspends a basin, the fillet round the pole indicating the ribbon or bandage twisted round the arm previous to blood-letting, the pole for the patient to grasp, and the basin to receive the blood.

* * *

COMETS AND METEORS.

THE Chaldeans, who first marshaled the stars and gave the several groups the fanciful forms and names which the celestial constellations still retain, early noticed that certain prominent stars could not be assigned to any particular group, in consequence of their constant change of position. These were called planets, or wanderers, to distinguish them from the fixed stars of constellations. But occasionally those ancient students of the stars were astonished by the sudden appearance of luminous bodies which in form and movement could not be classed with either planets or fixed stars. The diversity of forms which these bodies assumed, their sudden appearance, their rapid motion, and their limited duration, led the ancients to refer them to the regions of our atmosphere rather than to the upper heavens — the home of the true stars.

The Greeks called these strange visitors bearded stars, from which name our word comet is derived. The



DIFFERENT KINDS OF COMETS.

ancients regarded the visitation of a comet as a supernatural phenomenon, and always an evil omen — a portent of war, pestilence, the overthrow of empires, the death of the reigning sovereign, or some other dreadful calamity. Even as late as 1456, on the appearance of

Halley's comet, the Pope issued a decree that special prayers should be offered at noon-day in all churches, "to deprecate the threatened wrath of Heaven." This frightful star is described as *cometa horrendae magnitudinis*, with a tail reaching from the horizon to the zenith. It is a matter of regret that the superstitious fears and excited imagination of the ancients rendered them incompetent to observe and transmit to us accurate descriptions of the various comets, the appearance of which they have noticed. For example, Ambrose Pare, one of the most accurate observers and clearest writers on general subjects which the sixteenth century produced, in describing a comet which he saw in 1528, says:

"It appeared to be of excessive length, and was of the color of blood; at its summit was seen the figure of a bent arm holding a large sword in its hand, as if about to strike. At the end of the point were three stars. At both sides of the rays of this comet were seen a great number of axes, knives, and swords of the color of blood, among which were a great number of hideous human faces with ragged beards and locks."

Seneca, the Roman philosopher, first suggested that comets might be planets in a modified form and governed by special laws; but Tycho Brahe was the first to make such accurate observations as to determine the size, distance and motion of comets, and to assign them their place among astronomical bodies. Newton in demonstrating and applying his universal law of gravity, reached the conclusion that the orbit of a comet is a very long eclipse, but Dorfel, shortly after, published a demonstration that the track of a comet is a true parabola. Halley, applying these principles, calculated the elements of the orbit in which the comet of 1682 was moving, for which he deduced for it a period of seventy-five years. Turning to history, he found that a comet had appeared in 1607, in 1531, and in 1456, showing intervals of but a fraction more than seventy-five years. He therefore confidently predicted that it would return early in the year 1758, but as that period approached it was discovered that the path of the comet would cut the orbits of Jupiter and Saturn at points near where these planets would be at that time, and the result was watched with great interest.

The attraction of Saturn retarded the comet fifty days, which brought Jupiter forward in his orbit nearly to the point where it cut the path of the comet, and a collision appeared imminent, but the stranger passed peaceably by without producing any visible effect on either the planet or his satellites; but the comet was so retarded that it did not reach its perihelion, or nearest point to the sun, till the 13th day of March, 1759 — more than twelve months after the time predicted by Halley.

In 1770 another comet passed so near to Jupiter as to become entangled among his moons for nearly a year, and when it escaped its motion was so modified that it moved in an entirely new orbit, yet the motion of the planet was not disturbed in the least. These circumstances prove that comets consist of matter in a highly rarefied state — probably not so dense as the lighted cloud that floats in our upper air. This is certainly true of the nebulous envelope and tail of a comet, for the fixed stars are often visible through these, but most comets have a distinct nucleus or head around which the envelope is wrapped, and to which the tail is attached. Of the nature of this body we know little beyond the fact that it is too dense to admit the transmission of light through it. Shining only by reflected light, the spectroscope has made no reliable revelations touching the kind of matter of which comets are composed.

The number of comets belonging to the solar system is, no doubt, very great, many of them being visible from distance even at their perihelion, and others being so small as to be visible only when in our immediate vicinity, and some make such immense voyages into space that they can hardly be regarded as belonging to us. Thus the comet of 1769 has a period of 2,089 years, and the great comet of 1680 will not be seen till the expiration of 8,792 from its departure. On the other hand, Encke's comet has a period of only 1,205 days, and performs its entire voyage within the orbit of the planet Jupiter. Halley's planet, with a period of seventy-five years, recedes from the sun 60,000,000 beyond the orbit of Neptune, the present boundaries of the solar system.

While planets move in orbits but slightly elliptical, and on nearly the same plane, and all move from west to east, the elongated orbits of comets cut the plane of the ecliptic at all angles, and many of them have what is called a retrograde motion — that is, they move from east to west. Comets differ from each other in appearance almost as much as they differ from other members of the celestial family. Some have no well-defined nucleus, but appear to be all tail; others have no tail, but appear like the fragment of a cloud, dense in the center and shading off to an ill-defined margin. Even the same comet at its several returns rarely has the same appearance. Halley's comet in 1607 had a tail 60° long, spreading out like a fan, and appeared to be divided into several rays extending from the head of the comet to the extremity of the tail. (See engraving.) On its next return (1682) the tail was but 30° long, and very slender; in 1759 it was scarcely visible to the naked eye, and astronomers inferred that it was wasting away and would soon disappear, but in 1835 it returned with a brilliant nucleus and a well-defined tail 12° long.

The most remarkable comet of modern times made its appearance in February, 1843. It was visible in daylight from the 28th of February till the 7th of March. On the 17th of March the nucleus, when 30° above the horizon, cast a distinct shadow, and its tail, of pearly white light, swept an arc of 40° on the celestial dome. This comet made a nearer approach to the sun than any other observed comet. In passing its perihelion, it came within 60,000 miles of the surface of that luminary, or one-fourth the distance of the moon from the earth. The heat of the sun being increased as the square of the distance inversely, the temperature of the comet at its nearest approach was 47,000 times as great as the heat of a tropical sun on the earth, or more than thirty times as hot as the highest heat of a blast-furnace. The velocity of this comet was even more astonishing. In passing its perihelion its motion, as measured at several observatories, exceeded 20,000 miles per minute, or a million and a quarter miles per hour. The elements of its orbit were carefully calculated by Professor Hubbard, of the Washington Observatory, and its periodic time fixed at one hundred and seventy years. We may therefore look for its return in the year 2013, but perhaps it will return so changed that its friends will not know it.

No comet, since comets were understood, produced more excitement and apprehension in the public mind than the comet of 1843. The astronomers had not predicted its advent, and as it approached the sun it was above the horizon only in daylight, and consequently invisible; but passing its perihelion it flamed out on the east of the sun, in a red-hot brilliancy that was visible even at noonday. With a speed of 30,000,000 miles per day it crossed the earth's orbit on the fourth day of its voyage, and in twenty days it was lost to the naked eye.

The circumstances under which this "blazing star" made its appearance added much to its power in calling out the latent superstition of the age. For several months previously the prediction had been confidently and zealously announced, both in this country and in Europe, that the end of the world was at hand, and March was fixed as the month of the general conflagration. The appearance of this great comet on the first of that month, and its rapid approach to the earth, produced an effect on the public mind that can be better imagined than described.

Science had scarcely relieved the world of its superstitious fears in regard to comets before another and apparently a more serious source of alarm was revealed. The eccentric orbits of comets cut the track of all the planets both in passing to their perihelion and receding from it — at least this is true of all comets whose orbits lie on or near the plane of the ecliptic, and whose paths extend beyond the orbit of Neptune. This being demonstrated, a collision between comets and planets was not only possible, but highly probable. The enormous size of some of those "pilgrims of the heavens," and the inconceivable velocity at which they move made the idea of a collision most alarming.

To add weight to these apprehensions, the early years of this century revealed a cluster of small planetary bodies revolving in irregular orbits between those of Mars and Jupiter. The astronomers interpreted these as the fragments of a planet which had once occupied this space, but had been broken up by some terrible catastrophe; and what so likely as a collision with a comet? But the discovery of a greater number of these asteroids, as they are now called, and a careful study of their orbits and the diversity of their movements, have convinced astronomers that these are original, independent bodies, and not the fragments of a broken planet. Moreover, a series of accurate observations on the movements of comets, and a comparison of these with observations previously made, have given us a better knowledge of the nature of these strange visitors, and a more familiar acquaintance has done much to diminish our fear of them. The exceedingly small amount of matter in comets, notwithstanding their great bulk, has been fully demonstrated. The comet of 1770 came so near the earth that, had its density equaled our planet, it would materially have increased the size of our orbit and proportionally lengthened our year. Yet our year was not changed even the fraction of a second. Laplace has shown that had its attraction equaled 1-2000 that of the earth, its effect could have been very readily estimated.

It may, indeed, be asked, What evidence have we that comets have any matter, and are not mere optical phenomena — luminous displays from some unknown law of light? This suggestion is answered by the fact that though they do not appear to affect, in the least, the motion of planets or their satellites, yet they are themselves very much disturbed by the proximity of planets, and this disturbance follows the law of universal gravitation. A ball of iron suspended by a silk cord, if charged with electricity will materially affect a ball of cotton batting, similarly suspended, if brought near to it, without being perceptibly affected itself, and yet the action is evidently mutual, and in proportion to the amount of matter in each body.

It is probable, from all their phenomena, that comets consist of matter in a gaseous state, and consequently, in the event of a collision, the solid planet would pass through the comet with little or no disturbance of either body except the change in the orbit of the comet from planetary attraction. The comet of 1770, previous to its entanglement among the moons of Jupiter in 1767, had an orbit that gave the comet a period of fifty years, but after its detention its orbit was so changed that its time was reduced to five and a half years. But this did not produce the least effect appreciable, either on Jupiter or his satellites.

METEORS.

Almost every clear night an observer may see a brilliant light stream across the sky, frequently traversing forty or fifty degrees of its arc, and leaving often a luminous trail, which is visible for several seconds. In common language these are called "shooting stars," but in reality they are not stars, as they do not belong to the far-off regions of space, but are evidently located in the upper regions of our own atmosphere, and are therefore properly terrestrial phenomena.

The special attention of scientists was first called to the subject by the great meteoric shower of November 13, 1833, and since that time many important observations have been made as to the nature of the bodies, and the periodical return of their display in numbers.

On that memorable 13th of November, 1833, several brilliant meteors appeared at irregular intervals during the early part of the night; but about two o'clock A.M. they became so numerous as to attract attention, and from that hour, till daylight rendered them invisible, the whole dome of the heavens appeared flecked all over with fiery particles darting down toward the horizon at every point. Occasionally one would appear as large as Venus, and in a few instances brilliant bodies nearly as large as a full moon would move along the sky, casting a distinct shadow of objects on the earth.

The line of direction traversed by these meteors, when traced backward, appeared to concentrate in the constellation Leo. This shower was seen all over North America, appearing with equal splendor from Labrador to Mexico, and from the Atlantic to the Pacific coast. The meteors moved in straight lines, or rather in such apparent curves as by optical laws are resolvable into right lines. On investigating the subject, it appears that similar phenomena were observed on the 17th of October, 902; 19th of October, 1202; 21st of October, 1306; 10th of November, 1787; 12th of November, 1799; 13th of November, 1818, in England; and 13th of November, 1822, in Germany. It appears, therefore, that meteoric showers occur in pretty regular series, having lost but twenty-seven days in 931 years. Since 1833 the November shower has been observed several times, on the morning of the 13th, and sometimes on the evening of the same day, but no recurrence compares in brilliancy with the display of 1833.

The position of these meteors in relation to the earth is variously estimated at from 100 to 1,000 miles distant. This is a difficult point to determine with accuracy, as the rapidity of their motion precludes the

METEORIC SHOWERS.

possibility of accurate observations with appropriate instruments. It is quite evident, however, that the phenomenon occurs at the point where the meteoric matter comes into contact with our atmosphere.

The theory of these meteoric showers now most generally adopted is, that a belt of nebulous matter revolves around the sun in an orbit resembling that of a comet, and that the orbit of the earth cuts this belt, and the earth passes that point about the 13th of November each year. Frequently, however, the earth passes the belt at a point where nebulous matter is but sparsely distributed, and then the meteors are not noticed. Several other meteoric periods have been observed: as the 9th of August, the 21st of April and the 7th of December, but at none of these points has the display been such as to compare with the November shower, either in number or brilliancy of the meteors.

Aerolites, or meteoric stones, are closely connected with meteors, though at regular meteoric showers no aerolites have ever been observed to fall. Even if the nebulous matter were stationary, the velocity with which the earth would strike it in our annual voyage around the sun would produce sufficient heat to volatilize any form of matter with which we are acquainted; and the contact with our atmosphere at a velocity of 170 miles per minute would be nearly equal to contact with a solid body. But a solid meteoric body moving in the same general direction as the earth, but at a different velocity, may be drawn into the attraction of our planet, and, revolving spirally around it, finally fall into contact with the earth's surface. The occurrence of such meteors, and the fall of aerolites, or meteoric stones, are quite common. These have very uniformly a similar composition, metallic iron always predominating.

HAPPY ACCIDENTS.

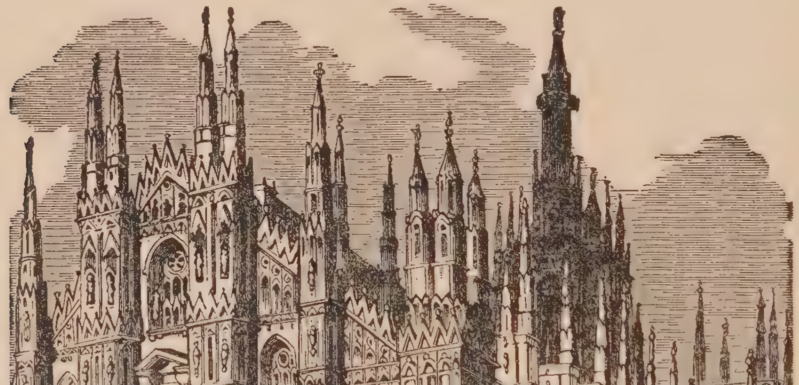
THE cracking of a picture placed in the sunshine set Van Dyck experimenting to produce a varnish that would dry in the shade. He found what he sought, and found besides that by mixing it with his colors they acquired greater force and brilliancy, and required no subsequent varnishing; and so came about the discovery, or rediscovery, of the art of painting in oil. Mezzotinto owed its invention by Prince Rupert to the simple accident of a sentry's gun-barrel being rusted by the dew. Henry Schanward, a Nuremberg glass-cutter, happened to let some aqua fortis fall upon his spectacles, and noticed the glass was corroded and softened where the aqua fortis had touched it. Taking the hint, he made a liquid accordingly, drew some figures upon a piece of glass, covered them with varnish, applied his corroding fluid, and cut away the glass around his drawing, so that when he removed the varnish the figures appeared raised upon a dark ground; and etching upon glass was added to the ornamental arts. Alois Senefelder, playwright and actor, thinking it possible to etch upon stone in lieu of copper, polished a slab for the purpose. He was disturbed by his mother coming into his small laboratory with the request that he would jot down her list of things for the wash, as the woman was waiting to take the basket away. There being neither paper nor ink handy, Senefelder scribbled the items on his stone with his etching preparation, that he might copy them at his leisure. Some time afterward, when about to clean the stone, he thought he might as well see what would be the effect of biting the stone with aqua fortis, and in a few minutes saw the writing standing out in relief. Taking up a pelt-ball charged with printing-ink, he inked the stone, took off a few impressions upon paper, and he had invented lithography. The pelt-ball used by Senefelder was long indispensable in a printing office. A Salopian printer, in a hurry to get on with a job, could not find his ball, and inked the form with a piece of soft glue that had fallen out of the glue-pot, with such excellent results that he thenceforth discarded the pelt-ball altogether, and by adding treacle to the glue, to keep it from hardening, hit upon the composition of which printers' rollers have ever since been made.

Three very different discoveries are recorded to have resulted from the unintentional application of intense heat. Pliny attributes the discovery of glass to some merchants traveling with niter, who, stopping on the banks of a river to take a meal, were at loss for stones to rest their kettles upon. Putting them upon pieces of niter, they kindled their fires; the niter, dissolved by the heat, mixed with the sand, and the merchants were astonished to see a transparent matter flowing over the ground, which was nothing else but glass. Charles Goodyear had for years experimented in vain, hoping to deprive india-rubber of its susceptibility to the action of heat and cold. Conversing with a friend on the subject, he emphasized an assertion by flinging a piece of sulphured rubber across the room; it lighted upon the stove, and when he picked it up a few days afterward he found the intense heat to which it had been subjected had conferred upon the india-rubber just the quality he had so long striven to impart to it. According to some he stumbled upon the discovery in a different manner; but, at any rate, vulcanized india-rubber was the creation of an accident. A Limerick tobacconist, looking dolefully at his poor neighbors groping among the smoldering ruins of his burned out shop, noticed that some of them, after trying the contents of certain canisters, carefully loaded their waistcoat pockets from them. He followed suit, and found the snuff had come out of the fiery ordeal very much improved in pungency and aroma. Like a wise man he said nothing, but took another place, set up a lot of ovens, and before long Black Yard Snuff—otherwise "Irish Blackguard"—was all the rage with lovers of nasal titillation; and in a few years Lundyfoot was a rich man, owing to the accident he thought had ruined him. A would-be alchemist, seeking to discover what mixture of earths would make the strongest crucibles, one day found he had made porcelain. Instead of transmuting metals, as he had fondly hoped to do, Bottger transmuted himself; "as if he had been touched with a conjurer's wand, he was on a sudden transformed from an alchemist into a potter."

MILAN CATHEDRAL.

THE first great cathedral erected at Milan, Italy, was destroyed by Attila; the next by fire, and the corner-stone of the third and present structure, of which we give a fine illustration, was laid March 15, 1387. It is one of the most remarkable old buildings of Europe. In length it is 486 feet; its width, 252 feet; height of crown, 153 feet, and height to top of statue of Madonna, 355 feet.

The interior contains fifty-two pillars of eight shafts each, supporting the arches of the roof; these shafts are eight feet in diameter and eighty feet high. The doorways are of ancient Roman style, and the floors laid in mosaic in red, white and blue marble. The exterior is of white marble, and has 4,500 niches and pinnacles, and in and upon each of these is a statue.



THE GREAT CATHEDRAL, MILAN, ITALY.

Milan is supposed to have been founded by the Gauls, was annexed to the Roman dominion by Scipio Nascica, 181 B.C. In the fourth century it held the rank of sixth city of the Roman empire, and is one of the few cities in Italy which have survived the devastation of the middle ages, and brought down its celebrity to modern times. It is sometimes called Little Paris.

THE CRISIS OF LIFE.

THE problem of life is a theme that has puzzled the brain of philosophers from the earliest records of time. It is the most wonderful subject that can occupy the mysterious avenues of the human mind. In its contemplation we enter a grander and more sublime field of thought, where expanding beauty and unfolding wonder seem to beckon us on step by step, from the terrestrial to the celestial, from earth to heaven.

In our passing thoughts we scarcely realize in what an ocean of life we are living. Life exists everywhere. In a drop of water a hundred beings sport and play; as much at home as the buffalo and wild horse of the plain, or the lion and tiger of their native jungle. There they are, a world within a tiny crystal drop; pursuing their natural inclinations, darting and coursing hither and thither in gay gambols, or pursuing and chasing down their prey; for, like the higher orders of organism, one class lives only by the destruction of another.

Millions die that millions more may live. It is one of the unchangeable laws of nature that construction depends upon destruction. There could be no death without life; and, on the other hand, there could be no earthly life without death. By far the greater portion of life is invisible to the unassisted eye. The microscope, one of the greatest of modern inventions, reveals these hidden wonders in innumerable numbers everywhere. The fine dust-like particles that float in the sunbeam, as it shines aslant through some little aperture or crevice in the wall, are shown to be countless millions of living beings. The atmosphere is filled with them. At every breath we draw a thousand die. The germs of future life are taken in with the food we eat, the water we drink, and the air we breathe, and finding their way into the blood, are conveyed by the purple current to the remotest borders of the human system, there to remain dormant until the great change takes place in our earthly bodies, and the sightless eyes are sealed in death — until the imprisoned soul leaves the perishable tabernacle of clay and flies to meet its Maker,— there to enjoy that other and grander future life, and then, when decomposition takes place in the soulless body left behind, those deeply implanted germs are developed, come to maturity, and perform their allotted part in changing the earthly temple.

During the transformations and changes which these minute monads undergo, hundreds perish where one arrives at maturity. Destructive influences and dangers are active around them, and they cannot stand the test. The crises of their lives are too strong for them, and they are swept away. If we will but take the trouble to look about us, we shall find that almost every object the eye can behold has had its crisis of life. The grass and grain of the fields undergo a crisis. The seeds are scattered in almost every conceivable position. In the little hollows and inequalities of the surface the plants are often so thick that they certainly cannot all come to maturity. They seem to start on an equal footing, but a struggle for existence soon ensues. It is the crisis of life. Part of the stalks droop and die; and the remainder, imbibing new life, push ahead, apparently with new vigor, and ultimately arrive at a golden maturity.

The stately oak sheds its thousands of acorns upon the ground beneath its branches. Not one in a thousand can live and grow where it fell. Hundreds of tender plants will spring up, but ere they reach a foot in height they are exposed to a host of dangers. Wind, and frost, and snow, combine and work their destruction; and animals feed upon them and trample them down. Some may exist two or three years; some eight or ten; and, perchance a single one may struggle on through the crisis, and live to rear its giant branches high in the air, a noble specimen, having passed the period of danger, and now living in strength and security, in defiance of the tempest of summer or the blast of winter. A single acorn may have been picked up by a squirrel, and carried away upon some distant hillside, perhaps miles away, and lodged in the earth among the rocks and stones, there to take root, spring up and grow; passing through the crisis of life alone, and leaving all danger behind, becoming a magnificent oak, firmly rooted, and an enduring landmark of the region.

The garden poppy produces thousands of seeds from a single bud; and the mustard that might grow on an acre would produce seeds enough to seed a nation. If every seed that is dropped upon the ground should take root and grow, uninjured by destructive influences, the whole earth would be covered with a solid mass of vegetation in a single year, and every form of animated life would be smothered and swept out of existence. But by the all-wise provision of an eternal God, who rules not only the destiny of worlds but the myriad forms of life that fill them, they are held in check, and carried forward in accordance with unvarying laws of being, well calculated to fill the mind with wonder at the wisdom and goodness of the Creator.

Chief among the agencies that keep vegetation back is the want of proper constituents in the soil. Corn requires certain properties to produce sufficient stalk, and to carry it forward to maturity. Wheat draws its component substances from the soil, and when it cannot find them in proper amount the weaker stalks wither, droop and die. Falling to the ground they return to mother earth what they have already drawn therefrom, that other more healthy stalks may drink and live. Millions of stalks are dwarfed and sickly for want of sufficient nourishment, and the grain they yield is inferior in both quantity and quality. Millions more pass through the crisis apparently with undiminished vigor, and produce a bounteous harvest.

And thus it ever is. A struggle for existence at the start, and another at the crises that are to follow. Business and political matters follow in the same train. A young man just starting in the world struggles first for a business existence; and in the hour of adversity, when banks fail and business is dull, he struggles against panics and hard times. It is the crisis of his business life. If he lives through it he becomes founded on better ground, and bids fair to become a successful man. For, like the stalk of wheat or corn that has withstood the crisis of drought, or frost, and witnessed the overthrow of its brothers, he has fewer rivals, and a greater field of action. A young farmer purchases a farm; he scarcely has capital to pay for it, yet he must have stock and seed and tools to work with. He works early and late; he practices economy and self-denial; he struggles for existence as a farmer. He succeeds; but an hour of trial comes. A disease gets among his cattle and sweeps them off; or his house, through some unforeseen accident, takes fire and is burned down. He has little money, for he has used it all in paying for his commencement in life. A feeling of discouragement seems almost taking possession of his mind, and he feels as though he were like the drooping stalk of grain, dying for want of nourishment. But no; he has a mind, and a will, and the illustration shall not apply. Arousing his languishing energies he grapples with the stern tide of adversity and conquers. It is the crisis of his agricultural life. His foundation is better than it ever was before, and his enjoyment seems better and deeper, and more lasting, for passing through the ordeal.

We have to make our choice in life, and to abide by the results of our decision when made. We cannot go two different ways at once, nor take a deep draught and keep the cup still full, nor spend and save. We can make a loaf of bread or brew a cup of beer at our pleasure, but we cannot make both out of the measure of meal that is enough for one. "Which shall it be?" is the great question to be asked by each of us; and the story of the choice of Hercules is repeated in the life of every man who thinks and every woman who feels.

Which shall it be — selfish happiness (if indeed happiness, which necessarily includes feeling, can ever be got out of selfishness), or generous consideration for others — "in honor preferring one another"? If we choose willfulness and opposition we must make up our minds to do without sympathy and love. If we are quarrelsome, arbitrary, irritable, and irritating — if we find our companions' sore points and rasp them rudely, or even more subtly than rudely — well, we choose this as our way; but we cannot have in return that pleasant reliance on our sweetness, our sympathy, our comfortable amiability, which makes the solace of those who turn to us in their moments of trouble and gives to us ourselves the happiness which we bestow. If we are light and frivolous, pleasure-loving, idle, caring only for the day's amusement, and not for what lasts longer than mere pleasure, we shall never be included in those holy moments of deep feeling which bind hearts to each other more than any amount of personal liking.

Nations and empires, as well as enterprises and individuals, also have their crises of life. On the 4th of July, 1776, the United States of America, as a free, independent nation, was born. The war of the revolution was a mighty struggle for existence. She gained the victory, and took her proud position among the nations of the earth. For eighty-five years she rose in power and greatness as no nation ever rose before. In 1861 the great civil war took place, and she was shaken to her very foundation. The conflict was the most terrible that the page of history records. The shock was fearful. The monarchial countries of Europe looked on, and laughed in exultation, fully believing, as they had predicted, that the experiment of free government had at length proved an ignominious failure. But the Union came through the crisis a free government still, and today she stands at the head of nations.

Man, as a physical being, has his struggle for existence and his crisis of life. His infancy and early years are exposed to almost unnumbered dangers. His tender constitution can bear but little, and a trifling sickness will waft the little sufferer into the boundless realms of eternity. It is said that one half of the human race die before they reach their eleventh year. Like the grain that springs up in the field, they cannot all live. Those early months and years of the young life consist of one long-continued struggle for existence. About the age of ten or twelve his existence seems to be more firmly established, and his chances for life appear to rest on a surer foundation. His bodily nature being established, the formation of his moral and mental character commences. The grander part of life is now to be severely tested. He is surrounded by all sorts of humanity. Those who chew tobacco, and take snuff, and smoke, are around him, and they seek to lead the young mind astray. Then there are those who gamble, and drink, and steal, with all their kindred vices: and with such he must meet almost every day. A thousand snares thicken around him, and temptations arise on every hand. It is the great crisis of his life. It requires courage to meet it. He who can stand boldly up and face the tempter, and learn to say *No* to all the evil allurements that may be set forth, is a hero. The taunts and jeers of fast young men may be rained upon him without mercy; but he knows he is in the right, and their bitter words cannot kill. The conflict may be fierce and long; but when an unbending will guides the reins of virtue, truth and honesty, it has the help of Heaven to carry it through, and its noble possessor will pass the ordeal unscathed and free.

PAST, PRESENT AND FUTURE.

IN these days of books and printed papers we can have but little idea of the inconvenience the ancients were subjected to in this respect. Then there were no printing presses, no lithographing; everything had to be written, and this was done with great difficulty for want of pens and paper, such as we have.

At first the writing was on tablets of wood, or stone, or metal, or ivory. It was common to cover a tablet with a thin coating of wax, and then with a pointed iron instrument scratch the writing; but this was found to be too unreliable for important matters, as the wax was easily melted off by heat, or erased by coming in contact with hard substances. To avoid this evil, the matter which they would preserve they engraved on the tablet itself, as inscriptions are now cut on marble. The Ten Commandments, we are told, were written on tables of stone. This writing, it is supposed, was an engraving. The Egyptians and Babylonians kept their laws and valuable records in this way. The same was true of the Greeks and Romans.

But these articles were found so inconvenient that they gave place to more pliant material; and this was found in a kind of paper made from the papyrus of Egypt. This was a marsh plant, like the bulrush, that was very common. Some have said that it was on the leaves of this plant that they wrote; but the paper proper was made from the stalk, either from the woody part or pith, or both. This was cut into sections, and then a thin layer separated with sharp instruments, as one draws a curtain from the roller. This was spread upon a table, and then another laid upon it so as to cross the grain, until the thickness desired was obtained. The whole was then subjected to pressure and dried, when it was found to be a very tolerable paper. It was then made into sheets of the desired width and length, and rolled on a roller. These rollers were often artistically made with curved handles, and when valuable, and possessed by the rich, were kept in cases of great beauty.

About this time, also, the skins of animals were dressed so as to be used for inscriptions. These were very durable, and were sought for, for important documents. It was on such that the Jews wrote the Scriptures, and it is said that from such rolls they still read the Scriptures in their synagogues every Sabbath Day.

The Egyptian paper, as it was called, continued in use for several centuries, but then gave place to a better kind called the Claudian paper. This was made of the papyrus, but was heavier and made smoother by sizing. It continued in use until the eleventh century, when cotton displaced it, and since that time the manufacture of paper has been carried to a wonderful perfection.

The rolls have also given place to the bound volume, and the type has almost displaced the pen. Important words and sentences are hardly written ere the press catches them and they are multiplied without number.

Now we can buy a book for a song, but how different in the early ages! We are told that Plato bought three books of Philolaus for sixteen hundred dollars.

Aristotle, it is said, paid three thousand dollars for a few books, and St. Jerome impoverished his estate to buy the works of Origen. A bible sold for one hundred and fifty dollars when labor was worth but about two cents a day. Now books are thick as blackberries, and a man can purchase a bible for one quarter of a day's labor.

In our journey through life, wherever we are and whatever our situation or avocation, we are continually learning lessons. Life might be termed a grand school, and we the students, for no rational being can live without this constant learning of something. These lessons may be simple, but they are numerous, and engage our time from the cradle to the grave.

Though these lessons may be simple and easily acquired, there is one very important lesson in life that is not to be acquired in a day, or even in years, by some. Many, indeed, have spent their whole life without learning it,—it is simply to learn how little we know and how much we do not know. Simple as this may seem to some, there is much embraced in it, and I think when this lesson has been once mastered by any one, he has learned the greatest and most important lesson to be known in life.

Knowledge is boundless. Having learned all we could on earth, something would remain. Man may progress as long as he remains in this world, and it is only fair to presume that the process continues in the next, and that with enlarged capabilities he continues to learn.

There can be no such thing as a complete education, at least on earth. But it is not seldom that we hear of persons who, having graduated at some college or place of learning, are spoken of as having completed their education. Such persons sometimes boast that they have learned all there is to know, and are hence incapable of receiving instruction. How mistaken this idea! One thing is lacking in such: they know not how little they do know. The greatest and wisest men that ever lived considered themselves but little nearer a perfect education than the child or youth. Having learned how little we know, we are wise. We are then ready to progress onward, knowing ourselves to be, what we really are, mere beginners in the great field of knowledge. Then, too, we should try to progress. Though we may never become eminent or notorious, though the world may never hear of us, we may become useful and honorable members of society by the acquirement of whatever degree of knowledge lies in our power.

Though we may never become Newtons in every respect, we may in one, and that is in a knowledge of our own insignificance. Near the close of his illustrious and eventful life he gave utterance to these beautiful and touching words, which are so applicable to us that all should remember them: "I seem," he said, "to have been only like a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay undiscovered before me."

Young men and women, you will soon have not only the ship of state, but the destinies of the world committed to your care! Resolve this hour to prove yourselves well worthy of the great trust. The young men who will be the statesmen, governors and presidents in the year 1900 are now among us. They are not found among those who frequent saloons, tippling-houses and gambling-dens,— they are to-day leading virtuous lives, eager in the pursuit of knowledge. The great book of Nature lies before us all, and inwardly the cry comes welling up in our bosoms — shake off this lethargic sleep of inaction! — arise, go forth and learn!

Surely the world moves, and we may be thankful that we live in these last days, when the knowledge of the world is open to its inhabitants, and the poorest may have their bible, their books and their papers, almost as free as the air they breathe. There may be better centuries to come, but no century of the past has been as good to live in as the one that has been given to us.